IRON & COAL

THE IRON AND COAL TRADES' REVIEW

VOL. 182
No. 4,827

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LONDON: FRIDAY, JANUARY 20, 1961

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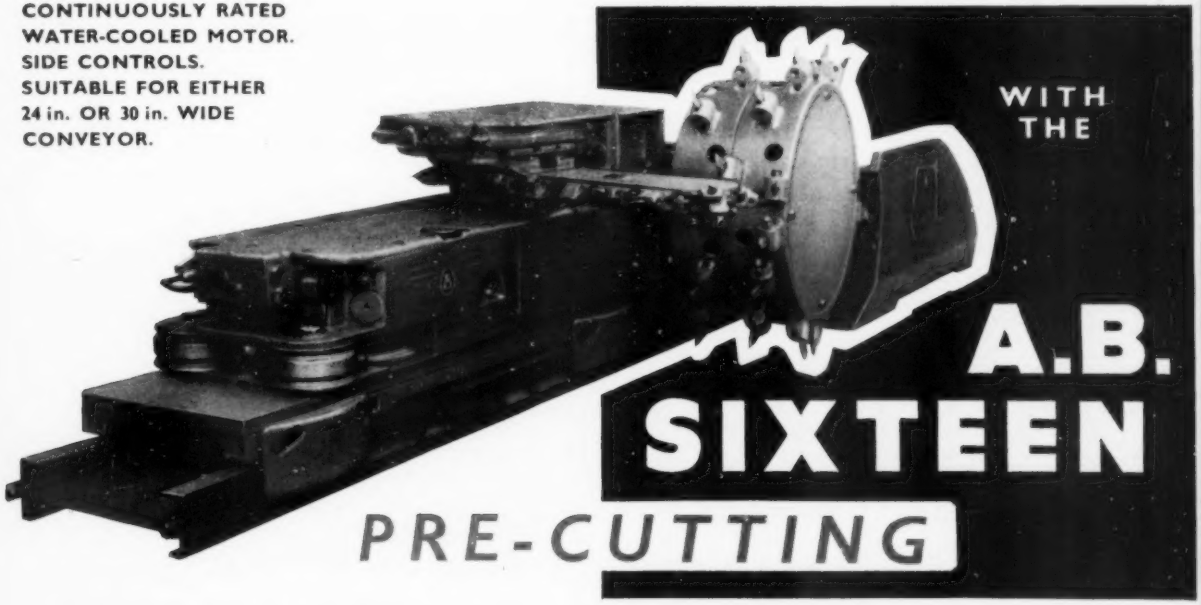

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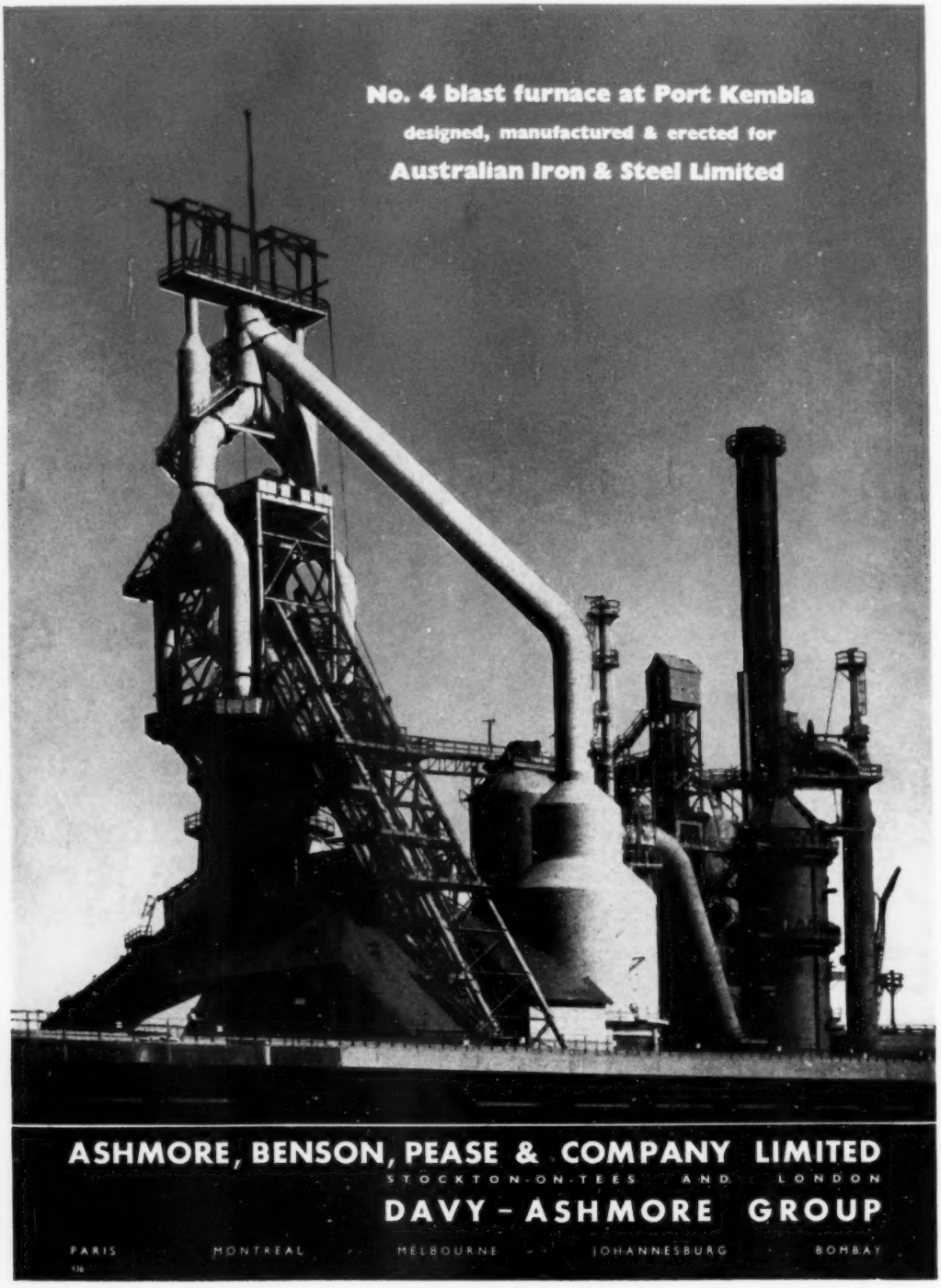
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a Q.C.

"... 'Members of the Jury' I'd begin—and I reckon that would be my lot.

"You want a cool, calculating brain to tackle a job like that. Every step planned in advance—on your toes every minute of the day and heaven help the client if you make a mistake.

"A bit like casting a roll when you come to think of it—except for the talking. Always one move in front of the metal, every detail worked out to a hair-breadth and all the time Charlie, the crane driver, is sitting in his box like a blooming judge.

"As for the Jury? Well, I reckon all of us at AW fill that bill, but speeches won't sway us—it's the **result** that counts here."

CLOSELOY ROLLS – perfection in Roll technique

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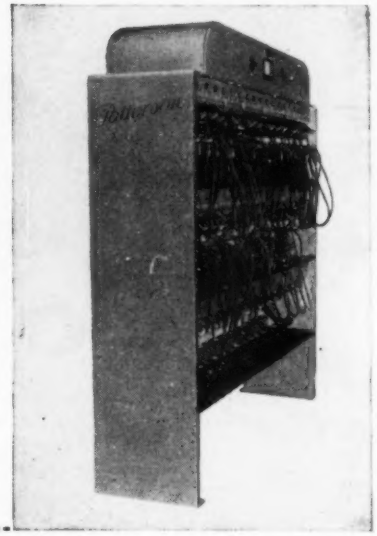
They are automatically kept at the peak of efficiency by the attractive new Patterson charging rack. This is based on the headpiece key-type charging system and is designed to increase lamproom efficiency and reduce lamproom labour.

The type SS 3 self-servicing cap lamp and headpiece. It fits any standard headpiece key-type charging equipment or can be used with the new Patterson charging rack.



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TGA P150A

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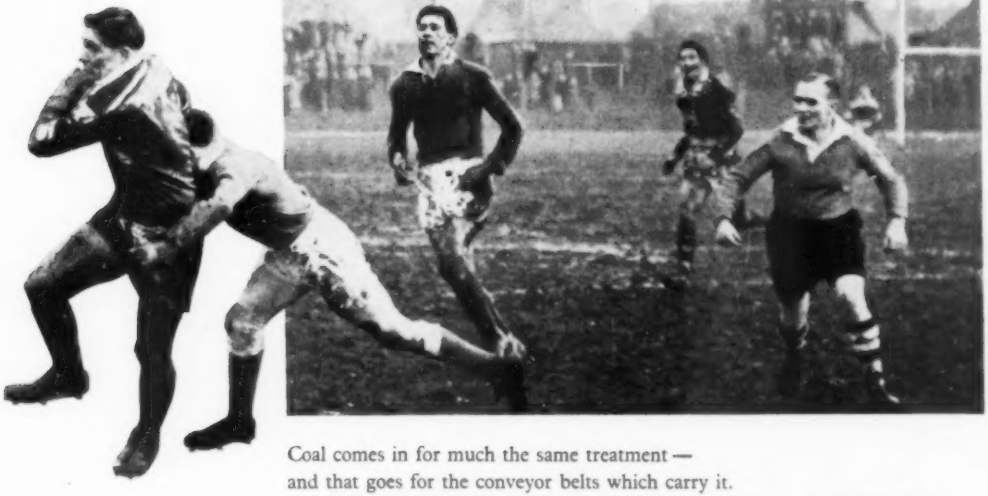
There's no quarter given, and none asked,
but this does not deter stars like Great Britain's John Whiteley
from giving consistent, top-class performance.

Photograph by courtesy of Hull Daily Mail



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and that goes for the conveyor belts which carry it.
That's why the new Fenner Diamond range of belting has been developed:
to stand up to the never-ending scrimmages of colliery life:
to maintain vital handling movements and to score
production points even under the wettest conditions.

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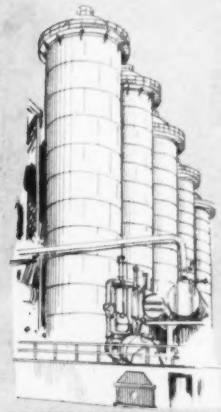

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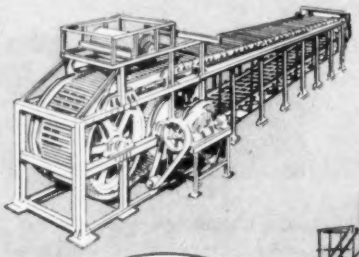
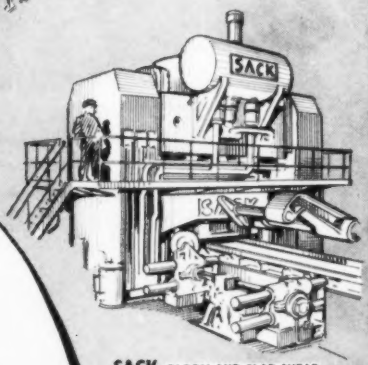


LURGI SINTERING MACHINE



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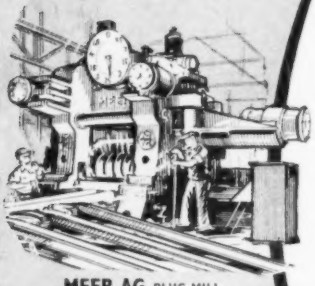
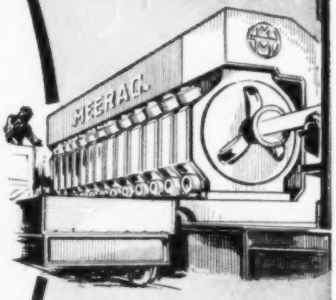
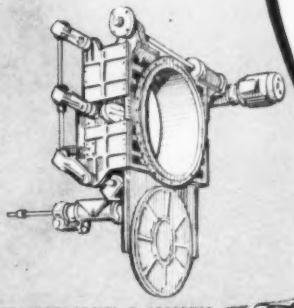


MEER AG PLUG MILL



MEER AG STRETCH REDUCING MILL



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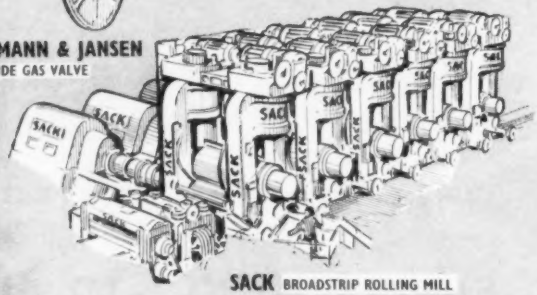
CRUDE GAS VALVE



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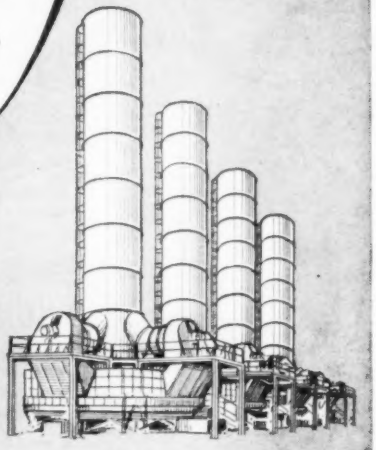

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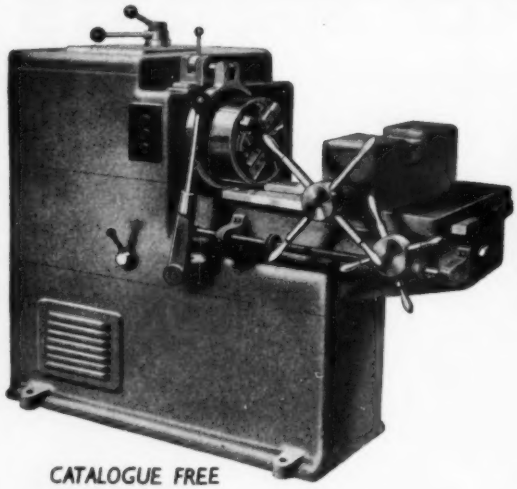

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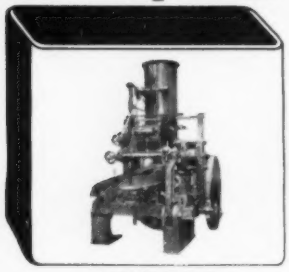
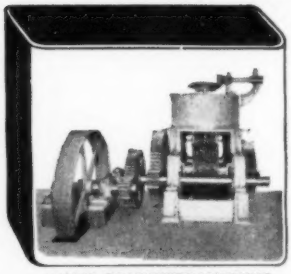
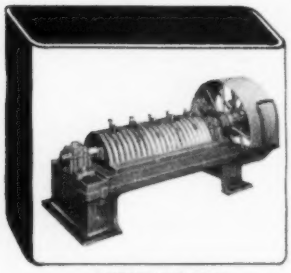


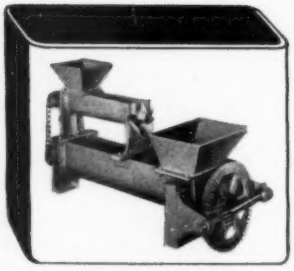
BLOCK PRESS



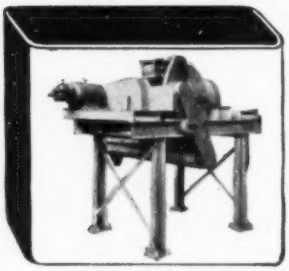
OVOID BRIQUETTE MACHINE



PITCH CRACKER



MIXER & MEASURER



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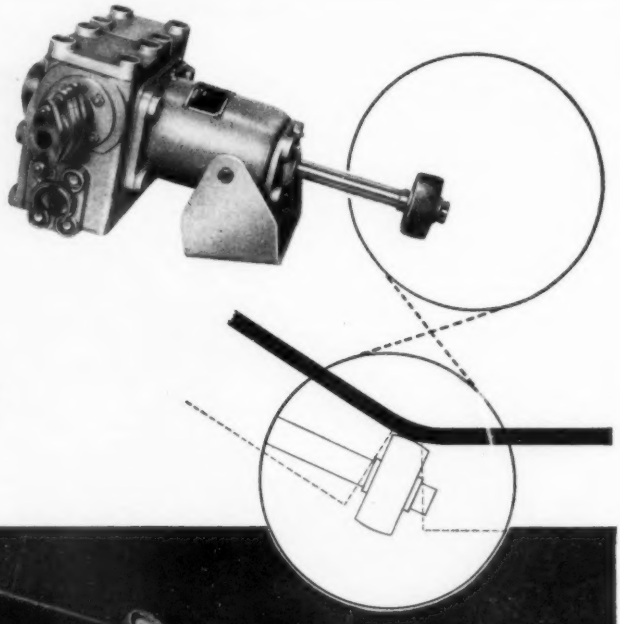
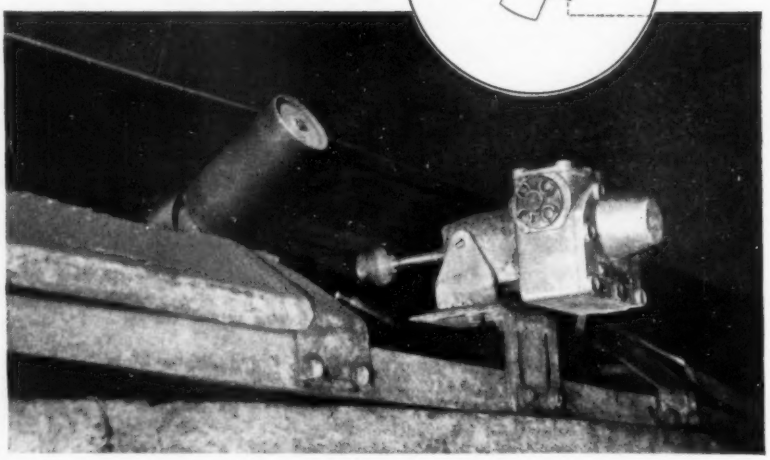
'ACOMB'

Sequence Control and Belt Protection Switches



FLP

There are many more good reasons for fitting "Acomb" switches explained in our technical folder. We shall be pleased to send you a copy.
Non-flameproof switch is also manufactured with cable glands to suit customers' requirements.



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- **ALWAYS IN CONTACT WITH THE BELT**
- **NO AUXILIARY DRIVE NECESSARY**
- **READILY FITTED TO EXISTING CONVEYORS**

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. . . you must be the chap who suggested we change
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V-belts with HIGH-TENACITY RAYON have:

Enormous strength.

A high resistance to impact, heat and stretch.

Greater dimensional stability.

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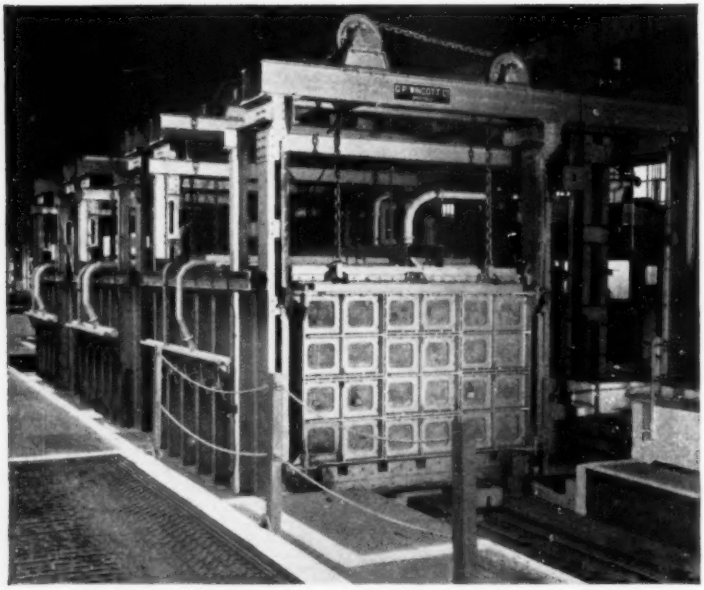
Cut fuel and labour costs in your **Steel Foundry** and achieve continuity of production by installing a **Triple Chamber Quenching Furnace**



By permission of Messrs. Edgar Allen & Co. Ltd.

The three separate chambers of this City Gas Fired Furnace are 12′ 0″ long × 10′ 0″ in effective width. They are each equipped with two electrically operated self-locking doors and operate as independent units.

The castings are preheated from cold to 300°C. in the first chamber and then pass to the second chamber where they are raised to 750°C. They are finally heated to 1100°C. in the third chamber and after soaking are quickly withdrawn by an extractor gear and conveyed to the oil or water tanks for quenching. The chambers are equipped with instruments for the automatic control of temperature, air/gas ratio and pressure. Prescribed heating curves can easily be maintained.

By utilising the third chamber as a cooling chamber the furnace can be employed for annealing purposes. When desired the first and third chambers can be independently used for the batch treatment of castings.

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design engineers . . .

. . . have found that Coopers give them a much freer hand. Shafting can be designed solely from stress considerations, with no fuss about "how to get the bearings in". Three series of Coopers are at their service — Medium, Heavy and Extra Heavy — in sizes from $1\frac{1}{4}$" to 30" bore (English and Metric Units), complete with sturdy, self-aligning Housings and Pedestals. Special bearings, up to 100" outside diameter — manufactured to customers' requirements.

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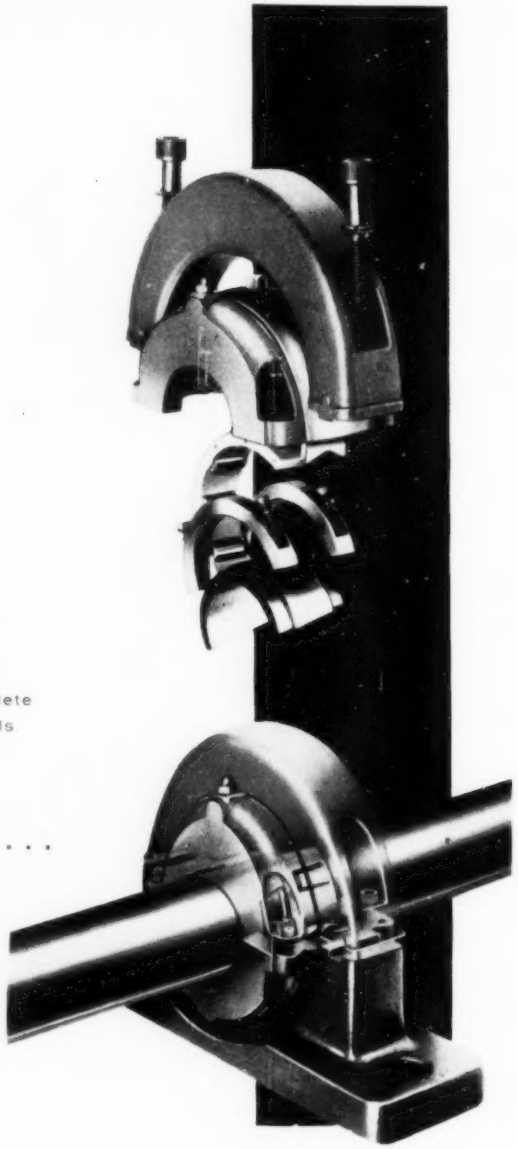
. . . can see the special advantages of Coopers at a glance. Time spent on assembly is a fraction of that required for ordinary ball or roller bearings. And the actual rolling surfaces can be inspected without disturbing shafts, gears and couplings. Coopers cut work, and cut costs. **Send for catalogue G.10/B to get the full technical facts.**



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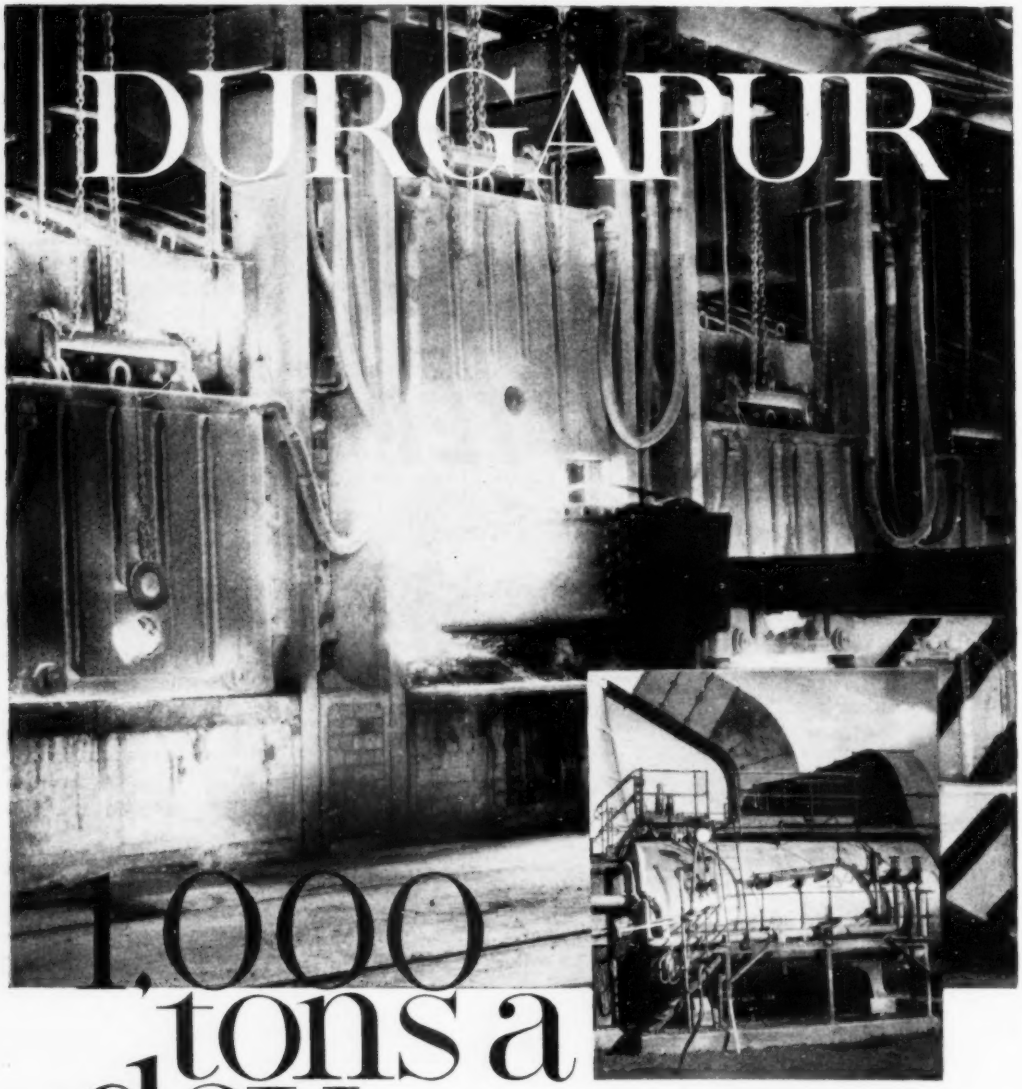

1,000 tons a day

but not only of steel. This is also the amount of steam generated by S-B-C waste heat boilers at Durgapur. The Spencer Bonecourt boiler shown above, inset, and six others like it, produces from 10,000 to 20,000 lbs of steam per hour—at 200 lbs per sq. in. S-B-C waste heat boilers were chosen by The Wellman Smith Owen Engineering Corporation Ltd., to operate in conjunction with their 200 ton open hearth melting furnaces for Indian Steelworks Construction Co. Ltd.

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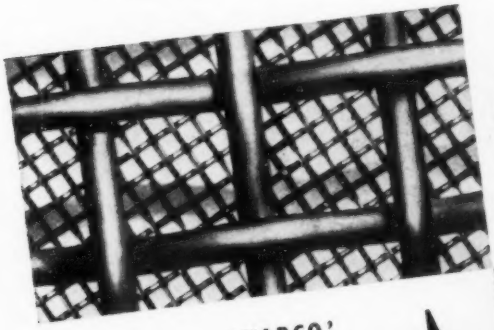
3 THINGS TO REMEMBER

WHEN ORDERING SCREENS AND FILTERS



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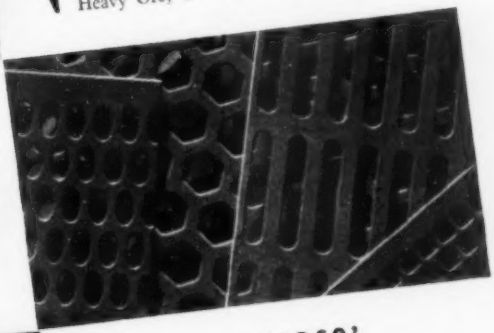

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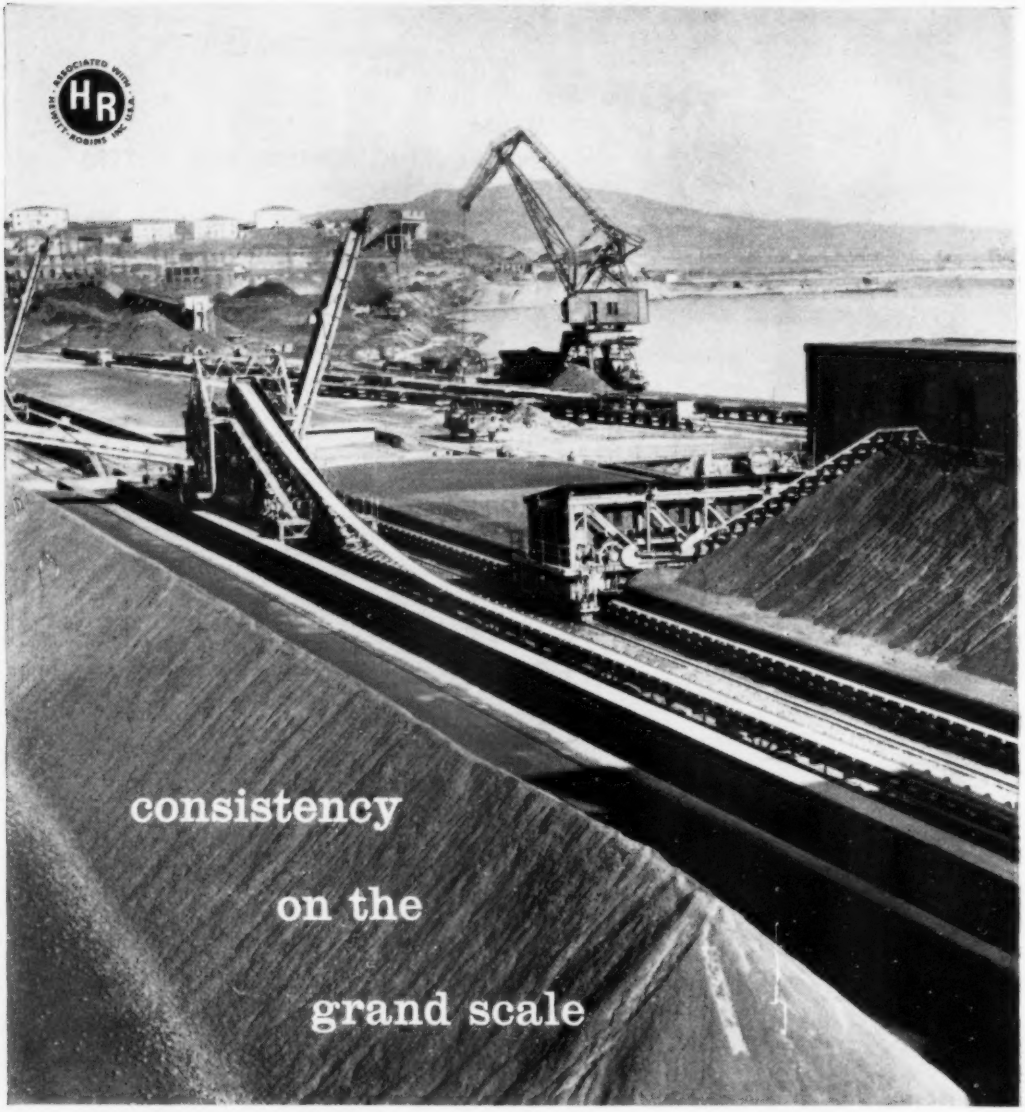
W/WE/P/2



Blast furnaces depend on it. Metallurgists count on it . . . Ores must be blended precisely, and fed with unvarying consistency to the blast furnace . . . That is the reason why Robins-Messiter blending plant was installed in Italy.

Rely on the experience of G.E.C.

THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND, FRASER & CHALMERS ENGINEERING WORKS, ERITH, KENT
360

THE HEWITT ROBINS EXTRA HEAVY DUTY

VIBRATING feeder

Shown in action above are TWO 4′ x 7′ type E.9 ELIPTEX Vibrating Feeders handling 250 tons of ore per hour.

Capacities up to 4,000 tons per hour are available with these rugged, fast, efficient units.

Maximum efficiency is ensured by the exclusive Hewitt Robins twin eccentric shaft vibrator assembly controlling the forward movement of material along the pan. ELIPTEX heavy duty feeders are further distinguished by:—

(A) ***heavy-duty construction***
(B) ***simplicity of design***
(C) ***low cost maintenance***
(D) ***reliable continuous operation under the most exacting site conditions***

These feeders are also available with non-plugging grizzly sections and Manganese steel liner plates. All units can be fitted with a variable feed device if required.

4′ x 10′ Grizzly Feeder operating in conjunction with portable stacker. Minus 12″ limestone is dropped 10′ to 15′ from a 3 cubic yard bucket straight on to the Manganese Steel Feeder deck. The unit has been operating for six years, 10 hours per day at 350 tons per hour.

STONE-WALLWORK LIMITED

THE J. Stone Group

(VIBRATING EQUIPMENT DIVISION)

32 VICTORIA STREET, LONDON, S.W.1

Telephone : ABBey 7681 Telegrams : "Stonwalabb" Sowest, London

Lubrication Plus Protection

Mobilux Grease is a lithium base lubricant of excellent structural stability and purity. It is a new, general-purpose grease superseding conventional greases. It provides effective lubrication for the majority of grease applications over a temperature range from minus 20°F to 250°F. It is exceptionally resistant to water washing and contains special additives to prevent rust formation. Both in the laboratory and in the field Mobilux Grease has proved its outstanding efficiency as a lubricant and protector.

MOBILUX GREASE

Mobil

ECONOMY SERVICE INDUSTRIAL LUBRICANTS

Guarantee

✳ *Conformity with B.S.?*

✳ *Trouble-free operation?*

✳ *Fair wear & tear safeguards?*

THE **ALLEN WEST** GUARANTEE means all these things, and more • • •

✳ SERVICE

When you purchase **ALLEN WEST** electric motor control equipment you know it is backed by an efficient country-wide —indeed world-wide—service organisation

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We stand by our products

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Engineers and Manufacturers of Electric Motor Control Gear and Switchgear

SUBSIDIARY COMPANIES IN CANADA, SOUTH AFRICA AND RHODESIA · AGENCIES THROUGHOUT THE WORLD

GRAB YOUR OPPORTUNITIES WITH TAYLOR JUMBO

Why? Because Taylor Jumbo cranes are specifically designed for the fast, economic movement of all bulk materials. Coal, coke, sand, ore—no matter what it is, these fast-moving cranes with the big capacity hydraulic grab provide the same, consistent, cost-cutting efficiency. But more! Just remove the grab—a few minutes task—and you have an accurate, all-purpose crane to handle **all** materials better.

F. TAYLOR & SONS (MANCHESTER) LTD.

HEAD SALES OFFICE: 143 SLOANE STREET, LONDON, S.W.1

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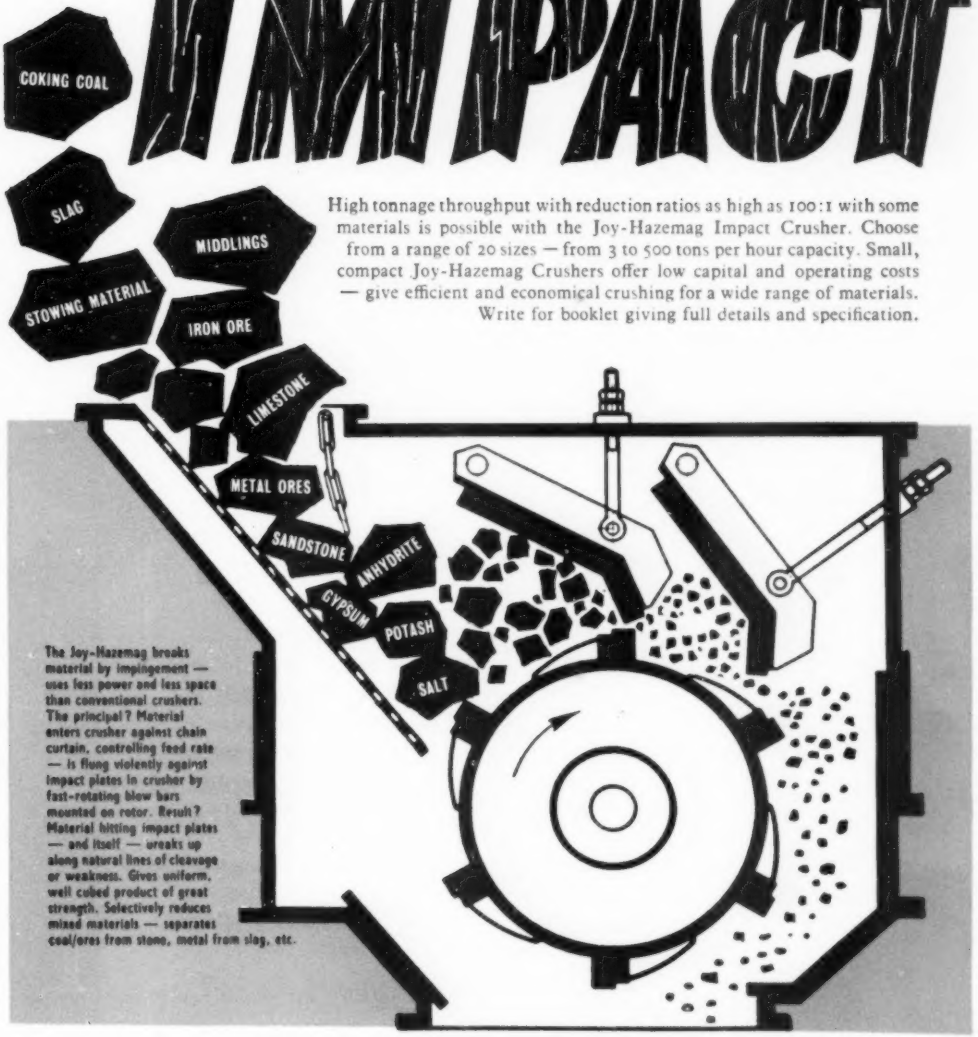
Specify Taylor Jumbo – It Pays

716

LOW COST CRUSHING BY IMPACT

High tonnage throughput with reduction ratios as high as 100:1 with some materials is possible with the Joy-Hazemag Impact Crusher. Choose from a range of 20 sizes — from 3 to 500 tons per hour capacity. Small, compact Joy-Hazemag Crushers offer low capital and operating costs — give efficient and economical crushing for a wide range of materials. Write for booklet giving full details and specification.

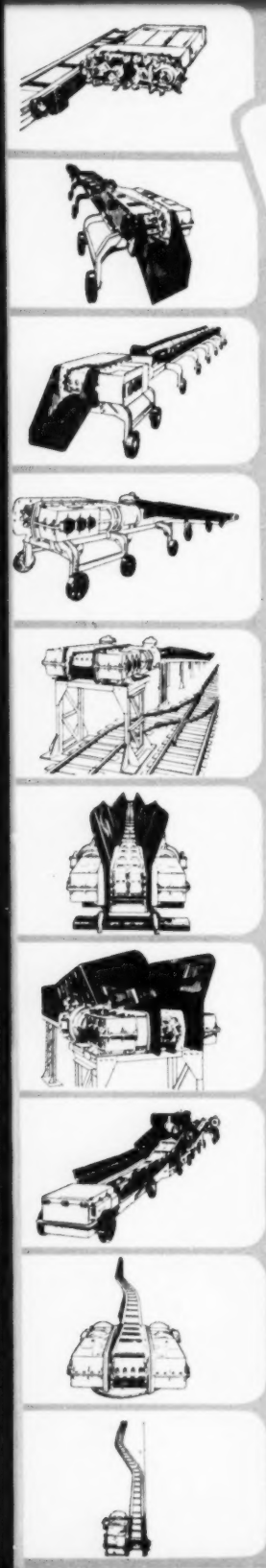


The Joy-Hazemag breaks material by impingement — uses less power and less space than conventional crushers. The principal? Material enters crusher against chain curtain, controlling feed rate — is flung violently against impact plates in crusher by fast-rotating blow bars mounted on rotor. Result? Material hitting impact plates — and itself — breaks up along natural lines of cleavage or weakness. Gives uniform, well cubed product of great strength. Selectively reduces mixed materials — separates coal/ores from stone, metal from slag, etc.

JOY-HAZEMAG Impact CRUSHERS

JOY-SULLIVAN LIMITED · CAPPIELOW · GREENOCK · SCOTLAND

HC1



CRAWLEY

for

POWER LOADING

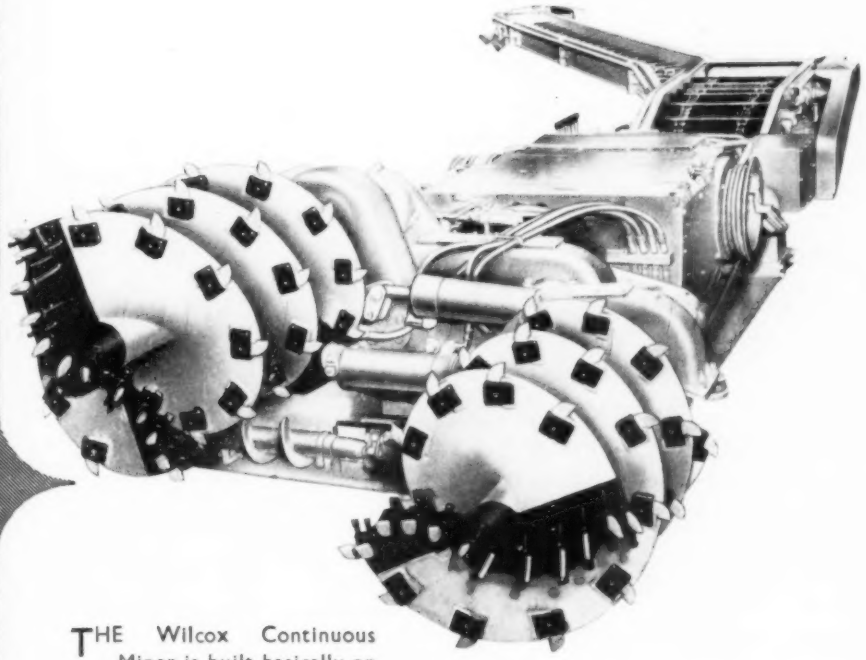
- WILCOX CONTINUOUS MINER
- CRAWLEY MIDGET MINER
- MOBILE STAGE LOADER
- MOBILE STAGE FEEDER
- EXTENSIBLE STAGE LOADER
- EXTENSIBLE TUB LOADER
- MOBILE BUNKER CONVEYOR
- STATIONARY BUNKER CONVEYOR
- MOBILE AND EXTENSIBLE STAGE COAL BREAKER UNITS
- HEAVY DUTY ARMOURED SNAKING CONVEYOR
- C5 LO-HITE ARMOURED SNAKING CONVEYOR

Crawley products are of high capacity, rugged in design and low in maintenance cost. They have a high degree of standardisation and interchangeability of parts, and offer an efficient and sure solution to the conveying and power loading problems common to the longwall system of mining throughout the world.

CRAWLEY INDUSTRIAL PRODUCTS LTD.
LLANELLY, CARMARTHENSHIRE. **Telephones and Telegrams: LLANELLY 4233**

A COMPANY OF THE AYLING INDUSTRIES GROUP

CRAWLEY-WILCOX
CONTINUOUS MINER



THE Wilcox Continuous Miner is built basically on a shortwall coal cutting machine chassis with two augers 41in. long and varying in diameter from 22in. upwards according to seam thickness. Each is equipped with carbide cutting picks on both front cutting edges and auger scrolls. The augers are driven through reduction gearing from the motor and rotate in opposite directions. Hydraulic controls are fitted as an integral part to both machine and conveyor.

Coal is discharged from the machine on to a bridging conveyor, which in turn discharges on to a chain conveyor. The bridging conveyor can pivot a full 180 deg. at either end, so giving maximum operational flexibility.

CAPACITY Results achieved to date in a seam of 36in. are as high as 300 tons per shift from an eleven-man team.

- **The lowest Continuous Miner on the market today in height, cost and maintenance.**
- **Cuts seams from 22in. to 46in.**
- **Can produce up to 300 tons per shift with two 3 men crews at the working face.**
- **Currently producing coal under roof conditions where other mechanical equipment has failed.**

MORE TONS PER MAN AT LESS COST PER TON

FOUNDRIES, REFRACTORIES, and ENGINEERING Service for Industry

Our foundries and engineering shops, the largest in South Wales, provide a service, not only to the nation's steel industry, but to all leading industries throughout Britain and the world.

IRON CASTINGS. Heat Resisting and Grey Irons to B.S.S.1452—up to 30 tons; Alloy Irons to specification—up to 8 tons. 'As cast' or machined.

SPHEROIDAL GRAPHITE IRON CASTINGS to B.S.S.2789—up to 8 tons. 'As cast' or machined.

INGOT MOULDS and BOTTOM PLATES. All types in Hematite Cast Iron—up to 30 tons.

SLAG LADLES. All types.

PATTERN SHOPS.

GENERAL ENGINEERING, FABRICATION, and MACHINE SHOPS.

SILICA BRICKS and REFRACTORY MATERIALS. Standard and non-standard shapes and sizes.

RAIL WAGON BUILDING and REPAIR in steel or wood.

LORRY BODIES (RTBODY) BUILDING and REPAIR in steel or wood.

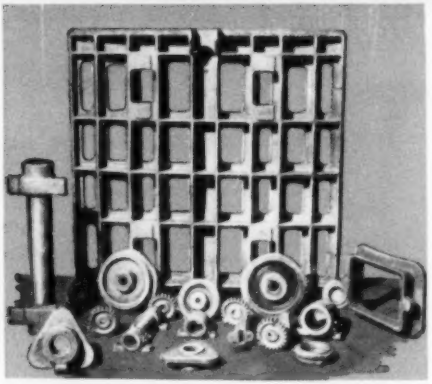
RTB

The services of Sales Technicians are available. Literature will be sent on request.

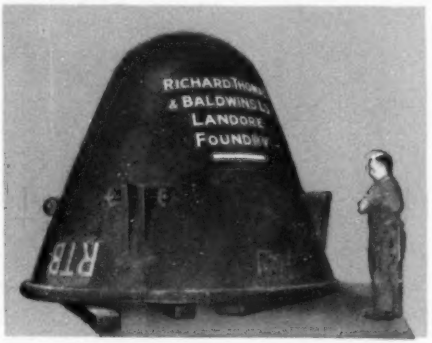
Richard Thomas & Baldwins Limited

SALES DEPARTMENT, LANDORE GROUP OF WORKS, LANDORE, SWANSEA, GLAM. *Telephone:* SWANSEA 7261 (6 lines)
HEAD OFFICE: 47, PARK STREET, LONDON W.1

Further Foundry and Engineering Facilities at our MACHYNYS WORKS, *Llanelly, Carms.*



General iron castings from Landore Foundry & Engineering Works, Swansea. (In background is a 6 ft. square frame.)



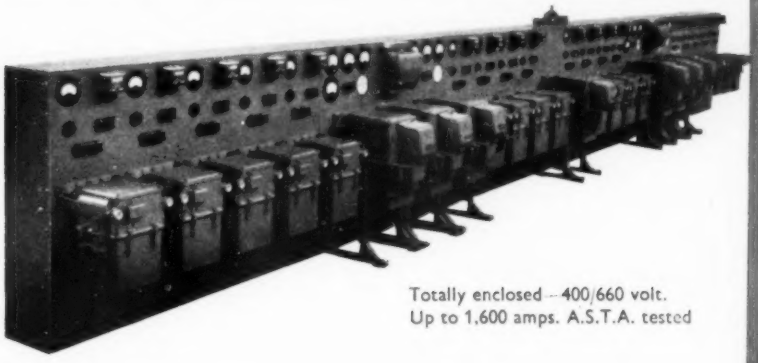
20-ton capacity cast-iron slag ladle.

Silica bricks in one of our despatch bays.

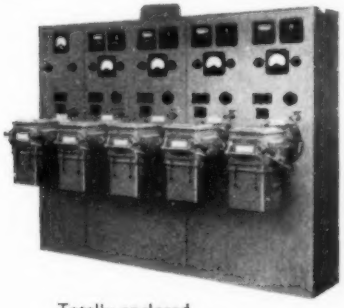
16-ton internal user railway wagon.

POWER DISTRIBUTION

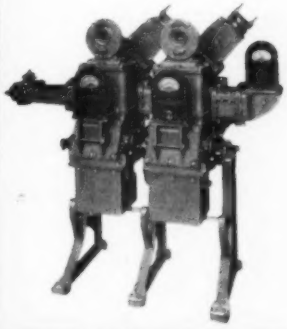
BY OIL-IMMERSED CIRCUIT-BREAKERS



Totally enclosed—400/660 volt.
Up to 1,600 amps. A.S.T.A. tested



Totally enclosed
3,300 volt—up to 400 amps.



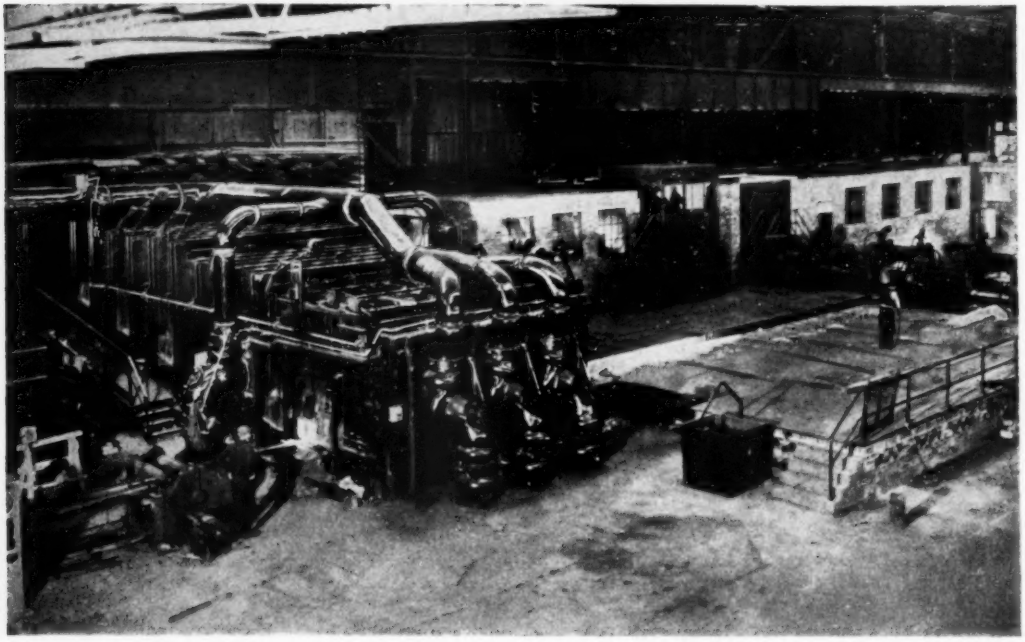
Flameproof
400/660 volts—up to 400 amps.
3,300 volts—up to 200 amps.

M. & C. SWITCHGEAR LTD.

KIRKINTILLOCH, GLASGOW

LONDON OFFICE, 26 VICTORIA ST., S.W.1. SHEFFIELD OFFICE, OLIVE GROVE RD.

3



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ROTARY FLAME

GAS BURNERS

Typhoon Gas Burners ensure intimate mixture of Gas and Air.

The absolute minimum of space.

Highest possible Flame Temperature.

Accurate regulation and absolute control of Furnace Atmosphere.

Increased Output with Less Fuel.

Equally suitable for crude producer gas, blast furnace, coke oven mixed or town gas.

Other Specialities

Morgan Gas Machines. Soaking Pits (Isley Controlled). Mill Furnaces. Hot Metal Mixer Cars. Morgan Airjectors. Nassheuer Continuous Bright Annealing Furnaces (Sole Licensees).

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(Successors to Julian Kennedy—Sahlin & Co. Ltd.)

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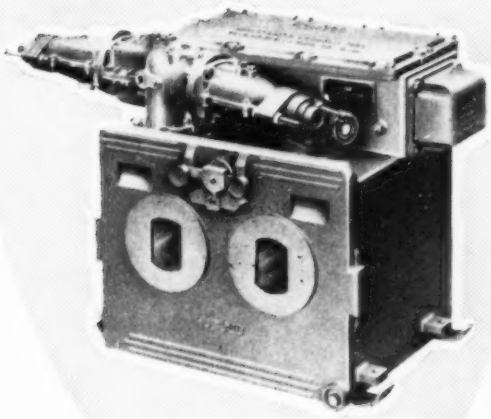
Phone: HOLBORN 1871-2 Grams: SAHLIN, WESTCENT, LONDON 2



General view of Huwood Recording panel with B.I.C.C. flit plugs.

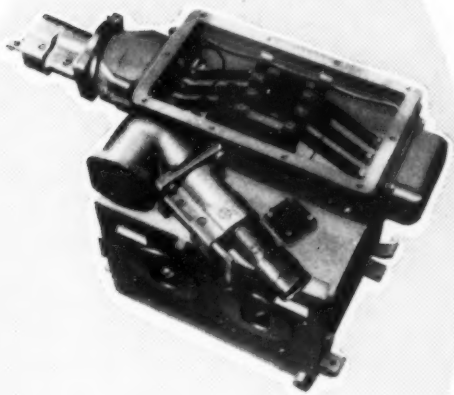
The HUWOOD FLAMEPROOF RECORDING PANEL Type HM12

The instruments most frequently supplied with the panel are a combination of ammeter, voltmeter and kilowatt meter controlled by a common drive and recording on separate charts, but the panel is suitable for power factor meter, frequency meter or integrating kilowatt hour meter.

FLP

A VERSATILE RECORDER

View of panel from above. Fitted with incoming and outgoing Huwood 100 amp. plugs and sockets. Provision for direct reading voltmeter (or ammeter).



Can be used with pliable armoured cable fittings such as the Huwood 100 & 30 amp. plugs—Groups I & II.
. . . with B.I.C.C. flit plugs—Group I, or with Huwood cable box—Groups I & II.

This flameproof recorder is available for many different recording instrument arrangements, is rated for up to 200 amps. 650 volts, and can be banked both with any gate-end box to N.C.B. specification and with most switchgear prior to this specification.

HUGH WOOD & CO. LTD.

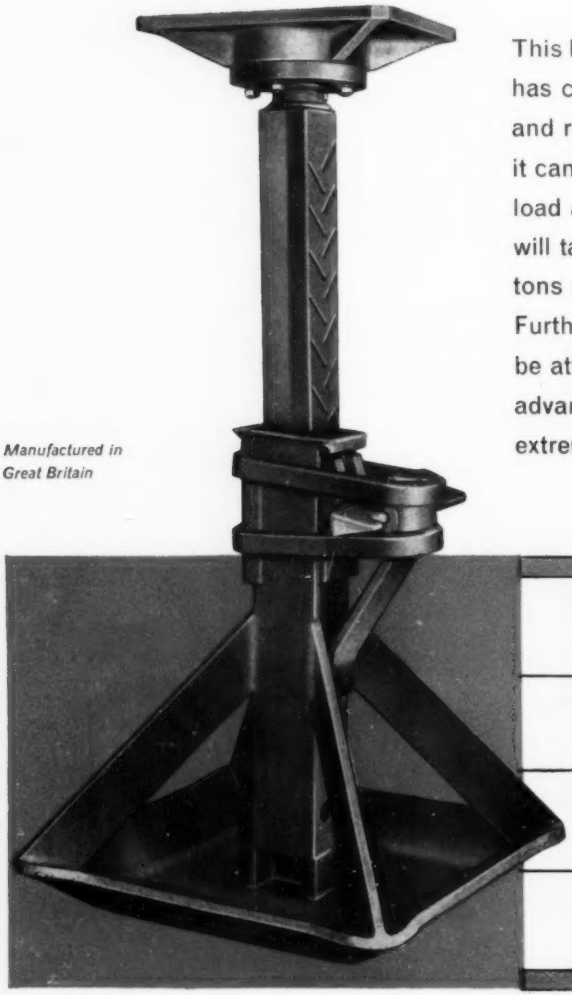
Head Office and Factories:
GATESHEAD - ON - TYNE, 11.
Telegrams: Huwood, Gateshead. Telephone: Low Fell 76083 (5 lines).

Industrial and Export Office:
ROYAL LONDON HOUSE, FINSBURY SQUARE, LONDON, E.C.2.
Telegrams: Huwood Stock, London. Telephone: Monarch 3273 (4 lines).

EE/FA/203

requires
no
chock
timber

the BECORIT F40 ton yielding chock



Manufactured in Great Britain

This latest addition to the range of supports has certain very definite advantages and requires no chock timber. In addition it can be pre-loaded to five tons, takes full load acceptance with minimum yield and will take alternate yield loads of 60, 50, 40 tons or less as required.
Further, the Becorit F. 40 chock can be attached to Panzer Conveyors. Economic advantages are low capital cost and extremely low maintenance costs.

BECORIT (G.B.) LIMITED
2 Leslie Road, Gregory Boulevard,
Nottingham. Telephone: 72207/8

BECORIT (S.W.) LIMITED
29 High Street, Cardiff,
Wales Telephone: 25492

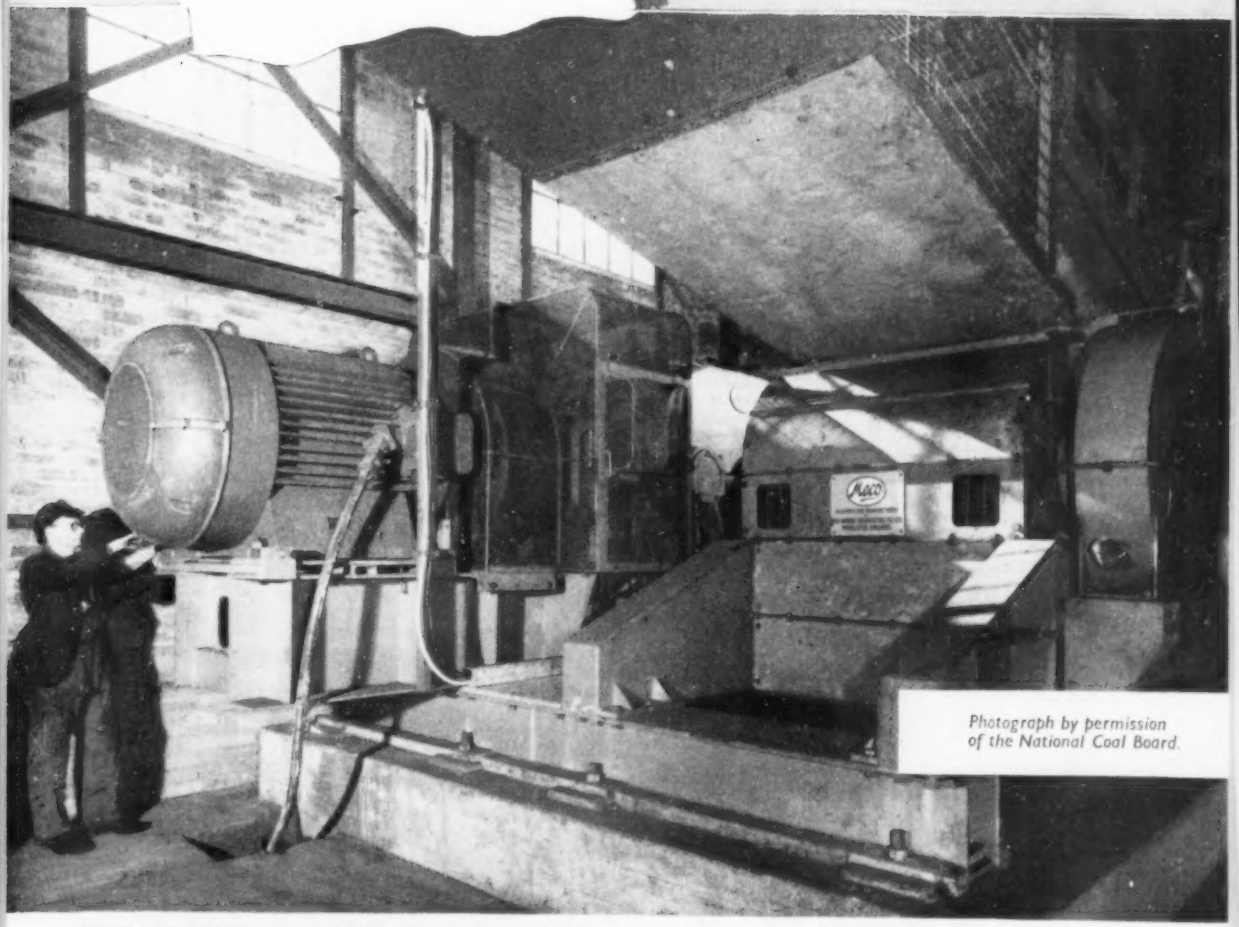
BECORIT (G.B.) LIMITED
42 Frederick Street, Edinburgh 2,
Scotland. Tel: Caledonian 5432

Messrs. E. WHEATLEY Ltd.,
13 Rockingham Street,
Sheffield Telephone: 25774

Meco

MAXIMUM ECONOMY IN DRIFT TRANSPORT

The illustration shows a Meco single power pack coupled to a double drum belt conveyor driving head. The conveyor is 2,146 ft. long with a lift of 478 ft. and carries over 2,000 tons day run-of-mine coal. The H.P. rating with the single power pack is 300 at 400 ft./min. MECO STANDARD POWER PACKS, SINGLY OR IN COMBINATION, CAN BE BUILT UP TO THE MAXIMUM POWER OF ANY AVAILABLE HIGH DUTY CONVEYOR BELTING.



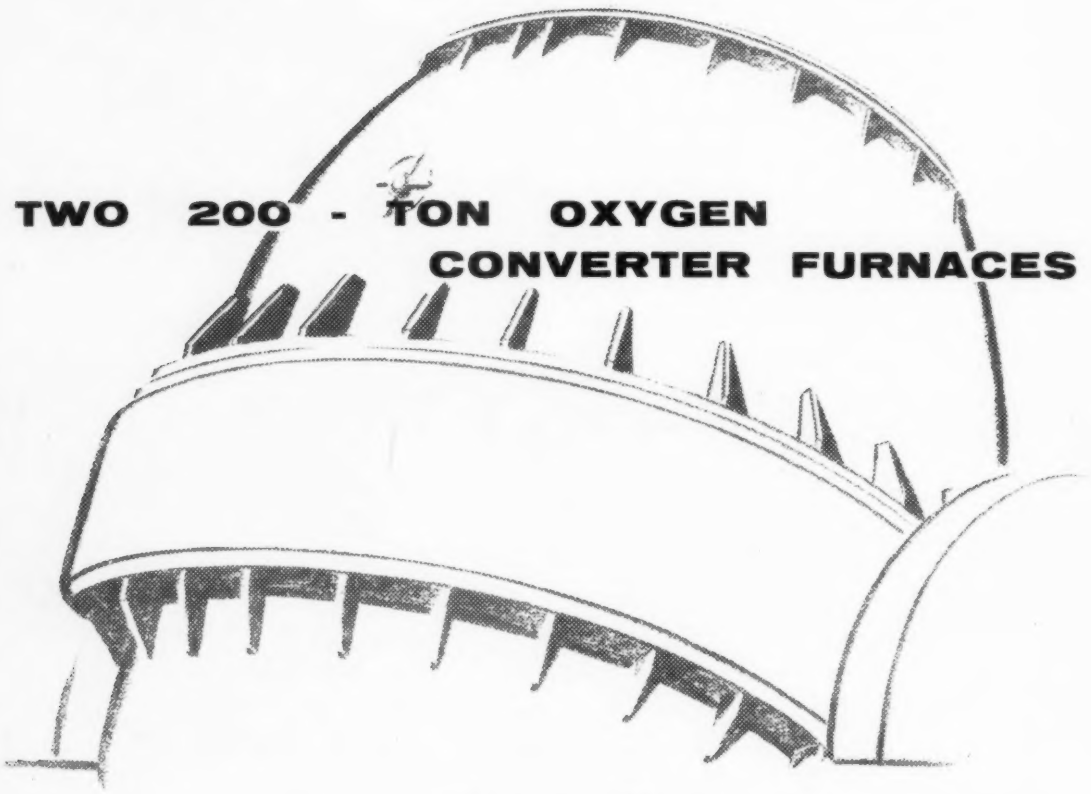
Photograph by permission of the National Coal Board.

THE MINING ENGINEERING CO. LTD.,
MECO WORKS, WORCESTER, ENGLAND.

Telephone: Worcester 22291 (7 lines).
Telegrams: MECO Worcester.
London Office: 50 Pall Mall, London, S.W.1.
Telephone: Trafalgar 4686/7.
Cablegrams: Mecomonde, Piccy, London.

L.P. 212—110

DAVY-ASHMORE to build



TWO 200 - TON OXYGEN CONVERTER FURNACES

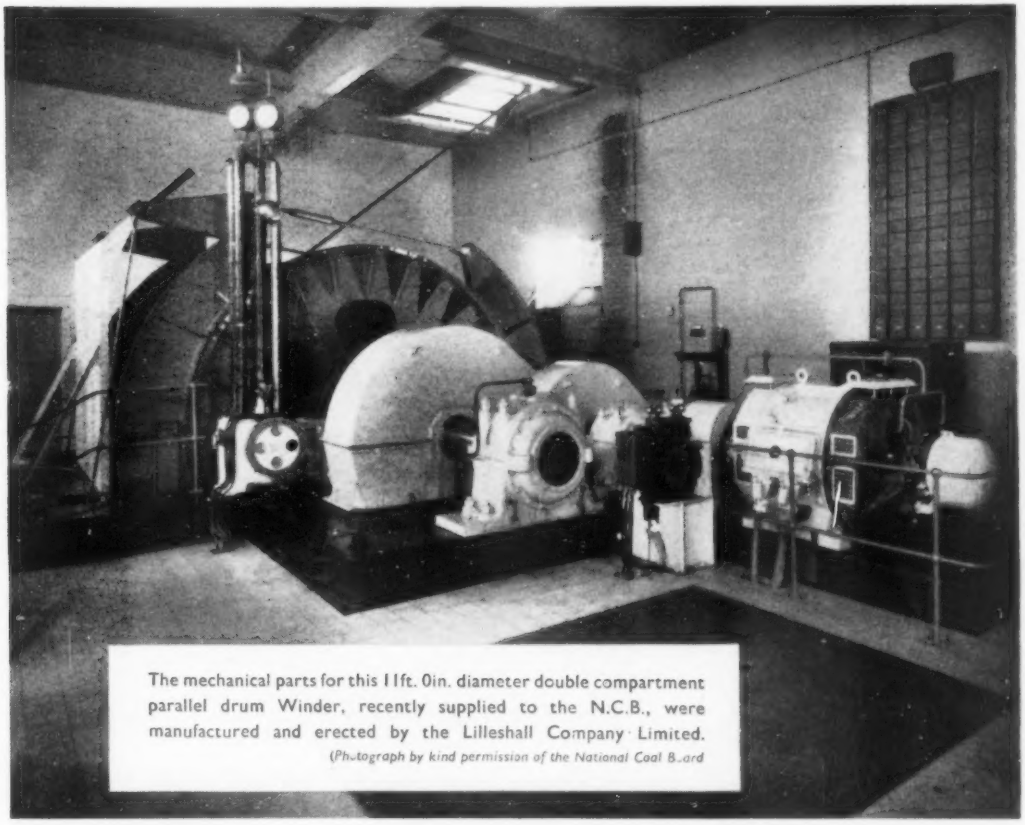
for Australia

Davy and United Engineering Company Limited, a member of the Davy-Ashmore Group, has secured the order to build two surface blown oxygen converter furnaces for the Newcastle Works, New South Wales, of The Broken Hill Proprietary Co. Ltd. Each of these furnaces will have a capacity at each charge of 200 tons of liquid steel.

DAVY-ASHMORE

London Sheffield Stockton Glasgow Middlesbrough Hull Paris Montreal Melbourne
Sydney Johannesburg Salisbury Bombay

DA/9



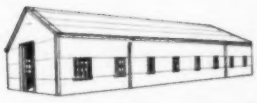
The mechanical parts for this 11ft. 0in. diameter double compartment parallel drum Winder, recently supplied to the N.C.B., were manufactured and erected by the Lilleshall Company Limited.

(Photograph by kind permission of the National Coal Board

Colliery equipment by

Designers *and users* of Colliery equipment since the reign of George III, the Lilleshall Company have been privileged to supply Headgears, Winders, Surface Buildings, Steelwork and other equipment to some of the most modern Collieries in the country. Other Lilleshall products include all types of structural steelwork, prefabricated buildings, refractory and common bricks, precast concrete products, timber products, glazed sanitary ware, and mechanical engineering.

LILLESHALL



KARISCOL

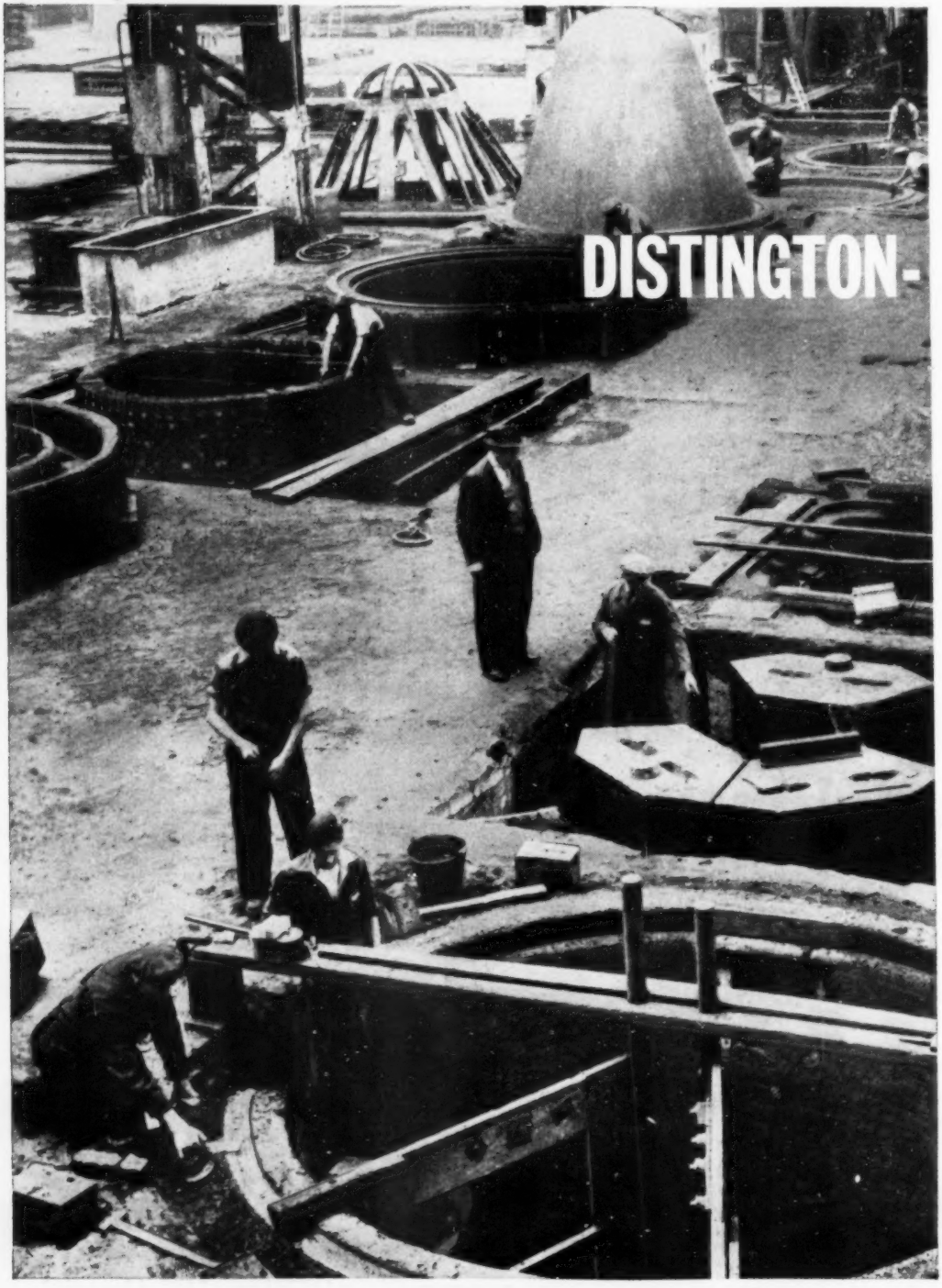
The Lilleshall "Kariscol" prefabricated building system eliminates on-site welding, minimum site bolting permitting speedy erection.

THE LILLESHALL COMPANY LIMITED

ST. GEORGES · OAKENGATES SHROPSHIRE

TELEPHONE: OAKENGATES 120

I.G.B.


DISTINGTON-

RECORD-BREAKING IRON FOUNDRY

At the Workington foundry of the Distington Engineering Company Limited records are being broken. The output of castings is over 2,500 tons per week. During the week ending 4th November 1960, 2,810 tons of ingot moulds, bottom plates, slag ladles and general engineering castings were produced, breaking Distington's own British and European record for an ingot mould iron foundry.

Slag ladles and engineering castings being made in the heavy casting bay of the foundry of the Distington Engineering Company Limited.

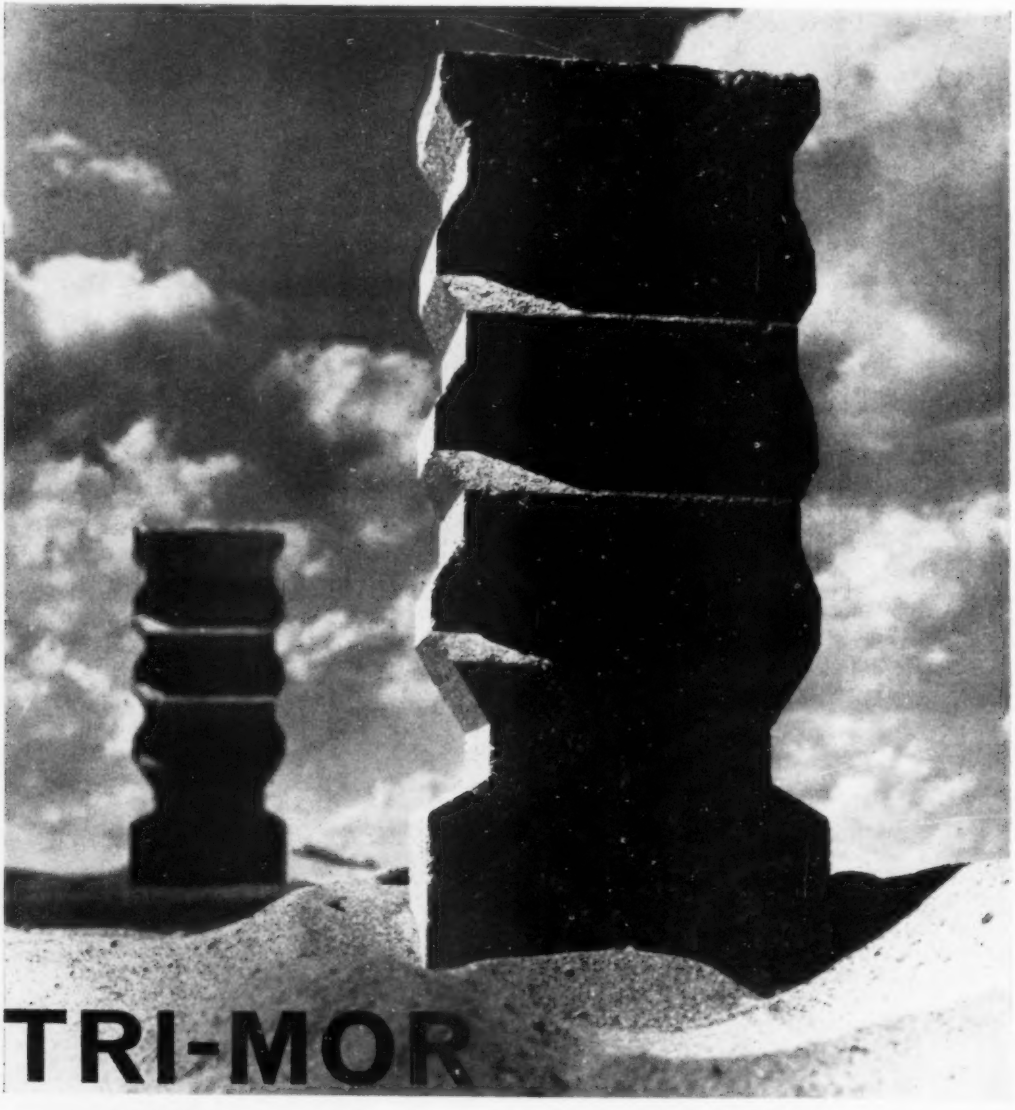
DISTINGTON

DISTINGTON ENGINEERING COMPANY LIMITED
WORKINGTON CUMBERLAND

THE UNITED STEEL COMPANIES LTD

A subsidiary of The United Steel Companies Limited

C.A.24a



mouldable and castable refractories made by...

TRI-MOR HIGH TEMPERATURE MOULDABLE · TRI-MOR STANDARD MOULDABLE · TRI-MOR HIGH STRENGTH CASTABLE · TRI-MOR STANDARD CASTABLE · TRI-MOR 1500 CASTABLE · TRI-MOR HIGH TEMPERATURE CASTABLE · TRI-MOR 1800 CASTABLE · TRI-MOR INSULATING CASTABLE · TRI-MOR DENSE GUNCRETE

MORGAN Refractories Ltd

MORGAN REFRACTORIES LTD., NESTON, WIRRAL, CHESHIRE. TELEPHONE: NESTON 1406

NE 165A

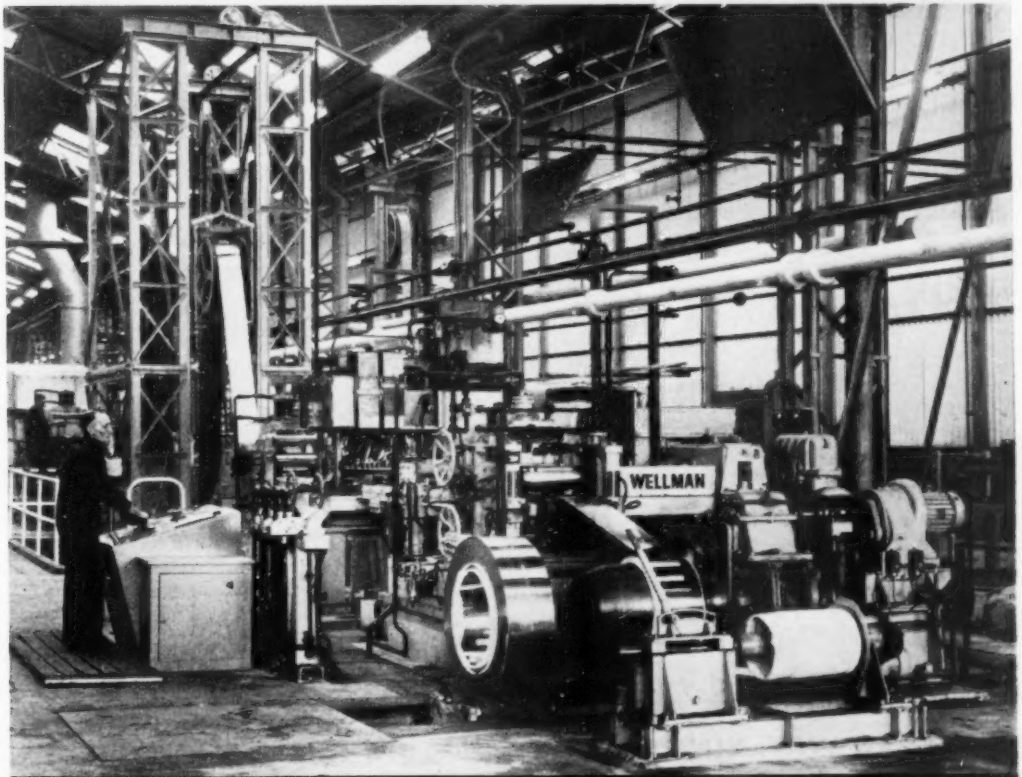
WELLMAN

Auxiliary
Rolling Mill Equipment

Illustrated below is the entry end of the 12" Cold Rolled Stainless Steel Softening and Descaling Line installed at the Shepcote Lane Works of Firth-Vickers Stainless Steels Ltd.

This is an interesting example of a Line designed and constructed for the final processing stages of narrow stainless steel strip, some of which is produced as wide hot rolled coils, and softened and descaled on three Wellman Lines prior to slitting into suitable widths.

We have supplied several such installations, in this country and abroad, together with the necessary auxiliary lines for Coil Build-up, Recoiling, Slitting and Shearing to length and suitable for all grades of Stainless Steels.



THE WELLMAN SMITH OWEN ENGINEERING CORPORATION LTD.
PARNELL HOUSE, WILTON ROAD, LONDON S.W.1 WORKS: DARLASTON, South Staffs, & BELFAST.

IN THE MINDS . . .
OF THOSE IN THE MINES

WESTINGHOUSE

CONTROL EQUIPMENT FOR THE BEST RESULTS IN THE SAFEST WAY

OVER 40 YEARS ENGINEERING EXPERIENCE IN THE DESIGNING, DEVELOPMENT, CONSTRUCTION AND INSTALLATION OF MINE CAR EQUIPMENT AND SYSTEMS FOR MINE TRAFFIC CONTROL

WESTINGHOUSE BRAKE AND SIGNAL COMPANY LTD.
82, YORK WAY, KING'S CROSS, LONDON, N.1. TERminus 6432.

Slag Handling
at Gartsherrie
for Bairds & Scottish Steel Ltd

A contribution in
TUBULAR STEEL
by Sutcliffe

Left—A view of the main conveyor with one of the penthouse covers raised.

Sutcliffe

Britain's Best Conveyors

Please write for a copy of our publication "Industrial Conveyors" quoting reference IR/116

RICHARD SUTCLIFFE LIMITED • HORBURY • WAKEFIELD

RS116

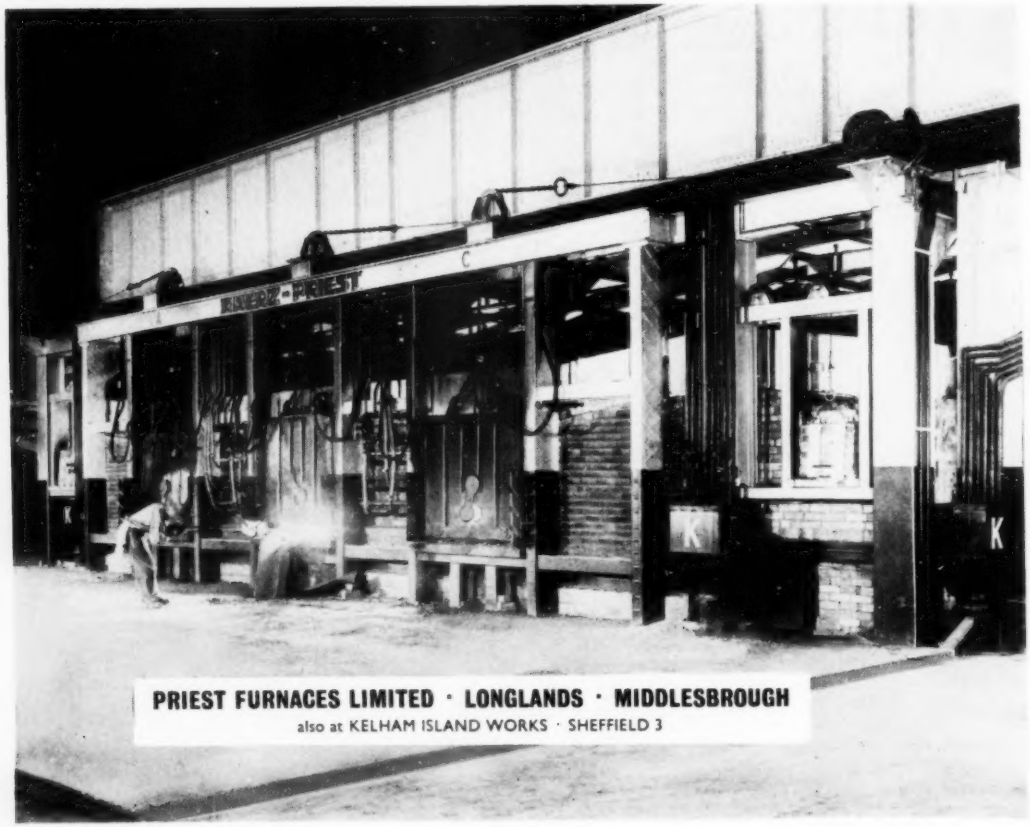
MAERZ

100 TON ALL BASIC
OIL FIRED OPEN HEARTH FURNACE

Installed at The Albion Steel Works of
The Briton Ferry Steel Co. Ltd.
This O.H. Furnace is providing consistently
high outputs on cold charged material
with excellent overall economy.

Priest Furnaces Ltd.

Sole representatives in Britain for **MAERZ** *open hearth furnaces*



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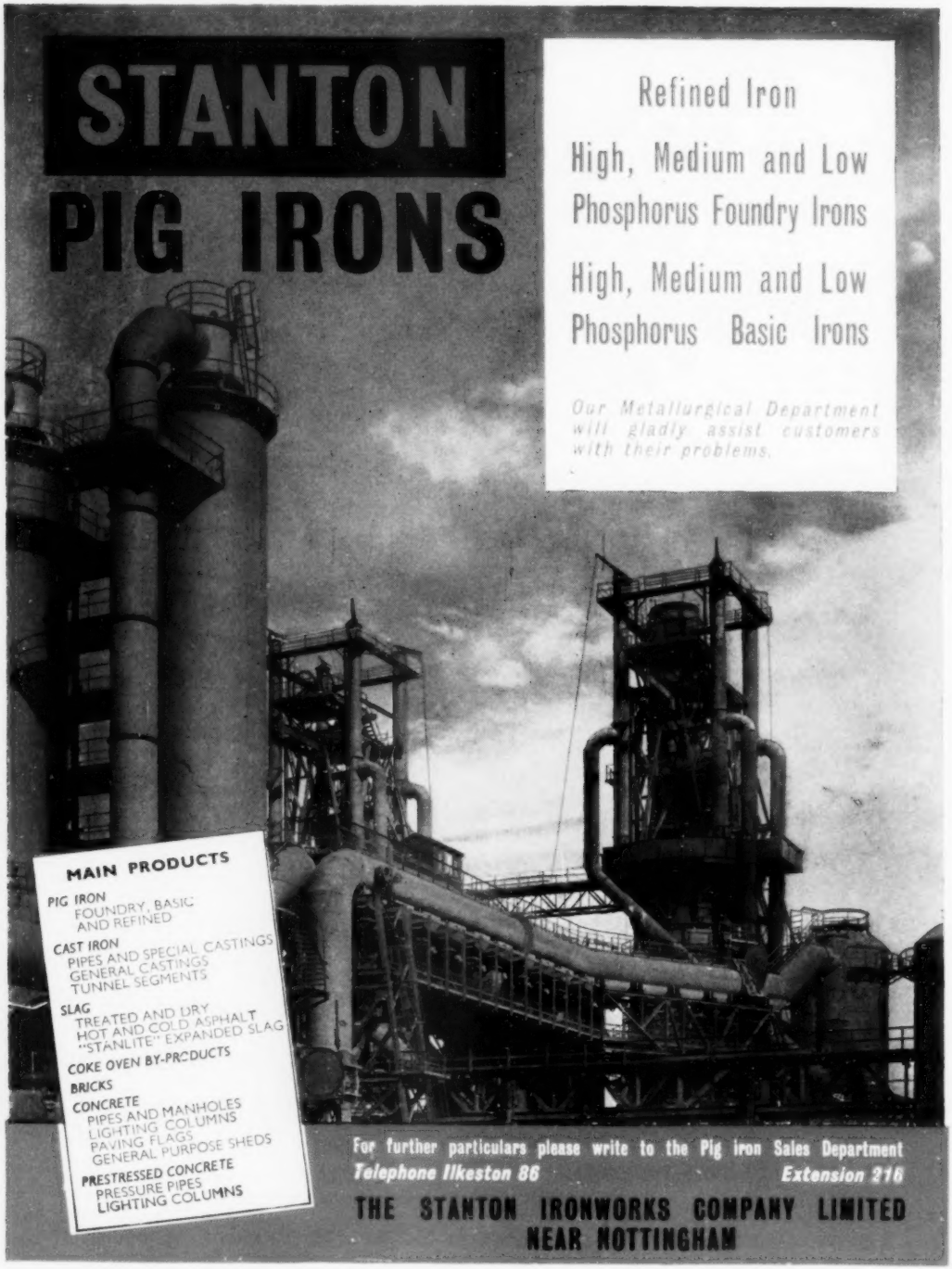
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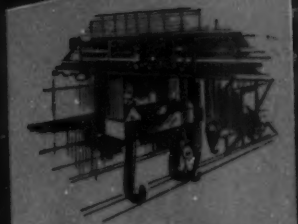

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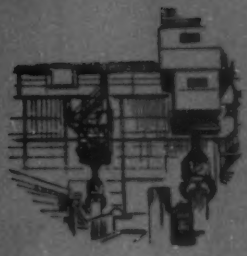

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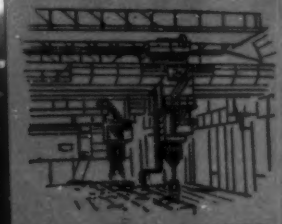

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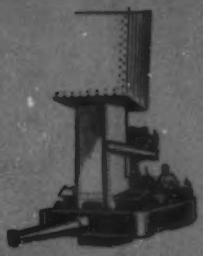

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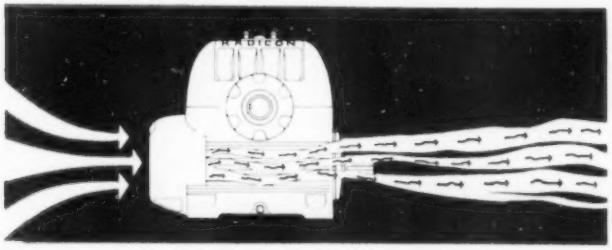

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Vol. 182
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IRON & COAL

THE IRON AND COAL TRADES' REVIEW

JANUARY 20
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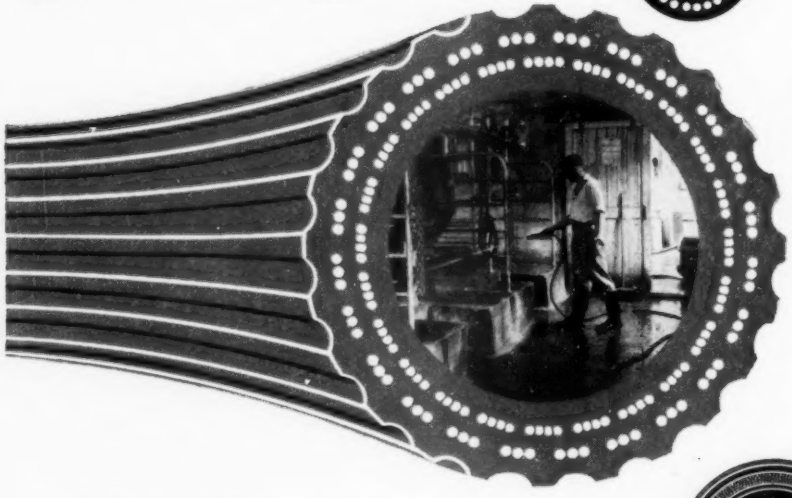

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IRON & COAL

Vol. 182 January 20, 1961 No. 4,827

Quiet Confidence

DURING the five years in which he has been chairman of the National Coal Board, Sir James Bowman has often felt himself able to express quiet confidence in the future of the industry which he has served as miner, trade union leader, and Coal Board official since the age of 15. On occasion, Sir James's confidence has not been endorsed by others concerned with the industry's future. But there can be few who would disagree basically with the confidence—even enthusiasm—for the future and humble satisfaction in the achievements of the industry in the past 12 months as expressed by Sir James in his annual statement to the Press on Thursday of last week.

As Sir James prepares to leave the leadership of the industry in other hands, there are many indications that the future of coal is more assured than it has been in recent times. A tremendous weight of criticism has been levelled against Coal Board policy from time to time, and especially during the past three years. Not all of it has been justified. But the board has made mistakes—errors of judgment might perhaps be a neater way of putting it—and has not always been prepared to admit them or to strive to remedy them quite as quickly or as resolutely as would have been desired in many quarters. But all who hope for a happy, healthy, and prosperous coal industry will be just as anxious as the board itself to concentrate only on the days ahead.

Headway has been made in the past year in bettering the prospects for solid fuel. In fact, the industry's sternest critics must concede that the coal scene is now brighter than seemed probable less than a year ago. Much has still to be done in reducing stocks, but they are being brought down steadily and there is a reasonable chance that the position in this respect will be about normal by the end of this year. The NCB's efforts to curb production so that it matches up to the lower level of requirements have met with considerable success. That this has been accomplished without any serious unemployment or political trouble reflects credit not only on the board but on the wisdom and influence of the miners' leaders also. The board is optimistic about maintaining the increased sales of solid fuel and this optimism would appear to be justified. The Government has estimated 300,000,000 tons of coal equivalent required by 1965, and Sir James firmly believes that no further drastic contraction of the industry, accompanied by heavy stocking, is likely to be necessary.

Sir James Bowman has shouldered heavy responsibilities indeed during the last five years and there will be general approbation that he is able to relinquish the burden of office at a time when there are distinct signs of something more than a mere temporary abatement of stress and strain within the industry. Sir James succeeded the late Sir Hubert Houldsworth as NCB chairman, his time of taking office being hastened by the sudden death of Sir Hubert. Of his former chief Sir James said: "It can be truly said that he laid down his life in the public service . . . Sir Hubert played an outstanding part in the building up of the nationalized coal industry." Of Sir James it can surely be said that he has done much to consolidate the works of his predecessor and, indeed, to establish his own imprint firmly on the pattern of the industry's future. He has earned respite from onerous duties in the service of his fellow countrymen, and, in wishing him good health and happiness in the future, we endorse the words he wrote in 1957, at the end of the first 10 years of nationalization: "Even in an age of oil and atomic energy, coal will continue to be the mainstay of Britain's prosperity."

Export Action Committee Gets Over 400 Suggestions

AN export medal or plaque to be awarded to factories with exceptional export performances, and export education in all schools, colleges, and universities, are two of the ideas and suggestions put forward for increasing British export consciousness to the Export Action Now Committee of the Institute of Directors, which staged its first mass meeting in London last week.

Under the chairmanship of Mr. C. O. Stanley, 800 businessmen, MPs, trade unionists, and advertising and public relations specialists were asked to send in their ideas. Among the 400 suggestions submitted were:—Women to be canvassed on a national scale for ideas for helping Export Action Now; a national competition for ideas to increase exports; an Export Action Now symbol; an approach to the Postmaster-General to design a stamp focusing attention on British goods for export; and the encouragement of British residents abroad to act as "ambassadors" for British goods and to seek out export opportunities for Britain.

To draw attention to the services which banks can provide for potential exports, a national poster competition with a prize of 500 guineas for the best design will be held.

THE US Export-Import Bank has granted new credit amounting to $2,300,000 to the Spanish steel concern Ensidesa, for the purchase of rolling-mill equipment in the US.

Passing Thoughts . . .

I THINK it is undeniable that high rates of direct taxation, particularly on those responsible for the direction and management of business, act as a discouragement to additional effort and risk-taking, and it may well be that this is particularly true of venturing into new export markets.

MR. REGINALD MAUDLING

But I do not think it would be right to do as is sometimes suggested and make special tax concessions on profits earned from the export trade. Quite apart from the difficulty of devising any scheme that would be effective and would be accepted generally as being fair, to introduce any special tax concessions of this kind would be to break international agreements which we have deliberately entered into in recent years. If we did so, it is certain that our competitors would do the same, and in the end none of us would be any better off.—MR. REGINALD MAUDLING, President of the Board of Trade.

Up till now British industry has only flirted with the Eastern markets. Must we wait until the external payments position is desperate before the necessary inferences are drawn and applied?—LORD BOYD-ORR.

With reference to manufacturers who are exporting and their export staff, not forgetting merchant and confirming houses, I think I can safely alter a very famous quotation to read: "Never in the field of national economy have so few helped so many."—Letter in the Birmingham Post.

Surely the time has come for all of us to stop bickering at each other and get on with the job to our mutual advantage.—MR. N. A. MCCRAE, *a director of the Glasgow shipbuilders, Alex. Stephens & Sons, Limited.*

Will the Labour cry for nationalization of the iron and steel industry now become as dead as a dodo? It has been the main plank of the nationalization call that privately-owned iron and steel did not meet the country's entire needs and preferred to be some degrees under. That plank has now been swept away.—Sheffield Telegraph.

Wise, responsible, and courageous leadership in all fields and at all levels is a prime requirement in 1961. Without it the prospects for 1961 are grim; with it they are exceedingly bright.—MR. W. H. SALES, *chairman of the North-Eastern Divisional Coal Board.*

Nobody in the coal industry is concerned to analyse last year's increase in consumption too closely; damp and cold weather in the summer in contrast with a very good summer in 1959 had a lot to do with it. So, the board's marketing division is convinced, had the general increase in standards of warmth that the British people appear during the last couple of years to have decided they owe themselves.—The Economist.

I would like to deliver coal like milk—a regular delivery.—MR. R. W. PARKER, *chairman of the Scottish Divisional Coal Board.*

Clean air is in the interests of all and miners realize just as much as anyone else that smokeless zones are a thing of the immediate future.—MR. SAM BULLOUGH, president of the Yorkshire Area of the National Union of Mineworkers.

It is notable that miners have moved from near the bottom to near the top of the wage league in the past 20 years without attracting any surge of men into what is now regarded as a dirty and sometimes status-lowering job.—Financial Times.

Neither the Coal Board nor the railways gain by high prices, for each has to pay the other. In fact, nobody gains but everybody loses. In any truly export-conscious country the two parties would either combine or enter into a barter agreement.—Letter in the Daily Express.

The innate conservatism (not political) of the average miner represents a problem. He does not like to leave one pit for another. Closures therefore are causing coal mining to lose its grip on traditional coal-mining families, whose members have remained in the industry for two, three, and more generations and who have always lived near their work.—KENNETH DODD *in an article in The Guardian.*

Martin, Black Forms Indian Company

NEW company—Usha Martin Black (Wire Ropes), Limited—has been formed in Calcutta by Martin, Black & Company (Wire Ropes), Limited, Coatbridge, in collaboration with Usha Automobile & Engineering Private, Limited, Calcutta. A new factory is to be built at Ranchi, in Bihar, for the production of high tensile steel wire and steel wire rope. Initial capacity will be 3,600 tons a year each of wire and wire rope, but this capacity could be doubled.

The Scottish company will supervise the purchase and installation of plant and machinery and will train Indian operatives in the techniques of wire and wire rope production in its UK factories as well as sending English technicians to India to advise and assist with the establishment of the new industry. Martin, Black will also permit the use of its trade marks and act as consultant and technical adviser to the new company for an initial period of eight years. Mr. W. S. Black and Mr. John Goodlet, directors of the UK company, will sit on the board of the Indian concern.

The issued share capital of the new company is Rs. 5,000,000 of which Rs. 1,000,000 is in cumulative redeemable preference shares of Rs. 100 each, and the balance of Rs. 4,000,000 is made up of 400,000 of equity shares of Rs. 10 each.

BRANCH OFFICE at Hertford House, 126, Broad Street, Salford (Lancs), has been opened by Foundry Equipment, Limited. From the new office Mr. R. King, a senior sales engineer, will look after the company's interests in the northern area.

LANGLEY PARK coke works (Co. Durham) is to be closed at the end of March, but it is expected that the 150 men now employed there will be transferred to other modern plants. Started 45 years ago, the works produced 2,500 tons of coke a week.

Again a Record

NORTH-EASTERN NCB MAY MAKE £15,000,000 PROFIT

THIRD record year in succession in terms of both efficiency and profit was reported by Mr. W. H. Sales, chairman of the North-Eastern Divisional Coal Board, presenting the annual review of the division at a Press conference on Monday. He estimated that when the profit for 1960 was announced in the near future, it was likely to be about £15,000,000 and went on to forecast that by the end of this year the Yorkshire coalfield would be on the threshold of "further phenomenal advances" in winning coal.

One of the major tasks for 1961, Mr. Sales said, would be to continue at increasing speed the operational efficiency of the coalfield. The key to this progress was mechanization which was now beginning to show results from the £177,000,000 invested in the division's 107 pits since nationalization.

MR. W. H. SALES

Of that sum £132,000,000 was spent on collieries, £12,000,000 on coke ovens and by-products plants, £20,000,000 on mineworkers' houses, and £13,000,000 on central services. During the past year some £16,000,000 had been spent in the division and a further big programme existed for 1961, even though the reconstruction programme had been to a certain extent modified.

Confidence Retained

Beyond the two prime resources in the industry—coal and the men who won it—all else was technique and their object must be to avoid dissipation of prime resources. "In the skill and experience of the men within the industry we have a resource which if lost could never be replaced," the chairman said "Anyone, therefore, who destroys the confidence of our workmen is, in the end, destroying the Yorkshire coalfield. I refer not only to the fillers on the coal face, but to the daywagemen on the haulage road, the surface worker and the under official, the clerk in the office, and the colliery manager. They have the knowledge and the skills which make this industry work. Without their confidence it cannot work."

Mr. Sales said it was intended to intensify the efforts already in hand to meet customers' requirements in respect of quality and consistency, consumer service, and efficient distribution; to continue to improve working conditions, safety, health, and welfare, and to recruit and retain a stable staff and labour force to meet the demand it was estimated would be made on the Yorkshire coalfield in 1965. Reviewing the work of the division in detail during the year, Mr. Sales rightly put safety at the head, describing what was being done to reduce still further the accident rate. This has been lowered since 1947 as follows:—Fatal accidents, 1947, 100, rate per 100,000 manshifts, 0.29; 1960, 46, 0.15; reportable non-fatal accidents, 1947 495, 1.49; 1960 345, 1.28. Accidents involving over three days absence have increased from 33,881 in 1947 to 37,055 (11 months) in 1960 and the rate from 104.1 to 154.8.

The chairman went on to deal with technical advances, marketing and carbonization, scientific and medical services, and recruitment, welfare, training, and consultation. The indications of an improvement in the general sales position in the latter part of 1959 were confirmed during the past year. The record level of steel production was reflected in the considerably increased demands from coke ovens; industrial activity remained strong and the general level of demand for most categories was high.

Stocks (including open-cast) amounted to 4,066,000 tons, or about four weeks' production, and nearly 2,000,000 tons less than 12 months previously. The stock lift was continuing and in Yorkshire was now at the rate of 70,000 to 80,000 tons a week. In the two holiday weeks covering Christmas, 1960, 200,000 tons of coal was lifted from ground stock and despatched to consumers—a record for any division in the country.

The amount of coal carbonized at coke ovens in the division had been reduced from 2,590,000 tons to 2,400,000 tons and the number of ovens in production at the seven plants at present in operation was 345, compared with 374 at the end of 1959.

During the year, 2,300 juveniles, 213 fewer than in 1959, were recruited but 572 more inexperienced adults and 2,193 more ex-mineworkers were employed, giving an increase in recruitment of 5,047. This, however, was not sufficient to cancel out the loss of 5,808 through wastage. An extensive recruitment advertising campaign was now having a beneficial effect.

Divisional output for 1960 was 40,417,168 tons, a drop of 1,487,939 tons on the previous year; 17 pits improved total output in both 1959 and 1960, 32 increased output in 1959 but not in 1960, 19 pits were down in 1959 but increased output in 1960, and 39 had less output in both years. Production was purposely kept below what could have been mined to fit in with the lower national target. Over 1,500,000 tons were lifted from ground stocks and sold during the year.

Manpower dropped from 127,562 to 118,919, but output per manshift increased—at the coal face by 4.8 cwt. and overall by 1.1 cwt.—both records. The rate at which OMS had increased over the past three years was unsurpassed in the history of the coalfield, said the chairman.

The policy of letting machines take over the heavy work had produced some dramatic results, notably in the South Barnsley Area, where well over half the coal won was power-loaded and conveyed to the pitheads virtually "untouched by human hand."

Personal

From West Midlands to Durham NCB

FINANCE director of the West Midlands Division of the National Coal Board for the past four years, Mr. WILLIAM MCINTYRE CROOKS has been appointed deputy chairman of the Durham Divisional Coal Board with effect from February 1. He succeeds Mr. A. H. Kellett who has been appointed chairman of the South-Western Divisional Coal Board.

Mr. Crooks, who is 52, was educated at Grove Academy and Dundee High School. He was apprenticed to Mackay Irons & Company, chartered accountants, of Dundee, and after appointments in London he became, in 1935, chief accountant of the Fife Coal Company, Limited. He joined the Scottish Divisional Coal Board in 1947 as chief accountant of the Fife and Clackmannan Area and in 1955 became assistant area general manager of the West Fife Area.

President of the Dutch State steel company Hoogovens, Mr. A. H. INGEN HOUSZ, has been made an officer of the Belgian Order of the Crown.

Managing director of the British Petroleum Company, Limited, Mr. M. A. L. BANKS has been appointed by the Minister of Power to be a member of his Advisory Council on Research and Development.

After 38 years with the Pfaudler Company, a division of Pfaudler Permutit Inc., USA, Mr. ALTON L. GRAY is joining Smith & Norrington, Engineering & Construction Company, of Boston (Mass), as general sales manager.

President of the Coal Trade Benevolent Association for 1961 will be Lord MOTTISTONE. Mr. JACK CHARRINGTON, Charrington, Gardner, Locket & Company, Limited, coal distributors, London, E.C.3, has been elected chairman for the year.

Mr. KENNETH W. BURNS, a member of the research and development department of the United Steel Companies, Limited, has received the degree of Doctor of Philosophy from Sheffield University. He was awarded the degree of Master of Metallurgy in 1958.

Works director of Beckett, Laycock & Watkinson, Limited, manufacturers of ships' windows, doors, etc., of London, N.W.10, Mr. H. CHAPPELLE has retired. He joined the company in 1925 as a designer, became chief draughtsman in 1929, works manager in 1930, and a director in 1937.

Council of the Institution of Mechanical Engineers has awarded the 1961 James Watt International Medal to Prof. Dr. THEODORE VON KARMAN, in recognition of his important contributions to the advancement of mechanical engineering science, particularly in the field of aeronautics. His nomination for the award was sponsored by the American Society of Mechanical Engineers.

Chairman of Oldham & Son, Limited, makers of storage batteries and miners' lighting equipment, etc., of Denton, Manchester, Mr. JOHN OLDHAM, left last week on an eight-week visit to the group's African companies—his ninth visit to South Africa in 11 years. Accompanied by Mr. ORLANDO OLDHAM, assistant managing director, he will visit Johannesburg, Port Elizabeth, Cape Town, Durban, and Salisbury, and probably East Africa.

General works manager of C. A. Parsons & Company, Limited, engineers, turbine makers, etc., of Newcastle-upon-Tyne, Mr. W. WINTER has retired after 50 years with the company. Mr. Winter, who started his career as a journalist, joined Parsons in 1911 and became successively chief inspector, deputy works manager, and general works manager. He was appointed general works manager in 1955 in succession to Mr. G. Baker, who is now managing director of the firm.

After 43 years' service with the General Electric Company, Limited, Mr. H. E. CARMODY, manager of the estimating department, has retired. He joined GEC as a commercial apprentice in 1917 and in 1921 became assistant accountant at the Newcastle-upon-Tyne branch. In 1929 he joined the head office sales department and in 1938 was appointed assistant manager of the Southampton branch. He returned to the head office sales department in 1942 and was appointed to his present position in 1943.

North-Eastern NCB Appointments

NEW deputy industrial relations director for the North-Eastern Divisional Coal Board is Mr. A. I. Farningham, who joined the board in London in 1952 as an administrative assistant. He served in the national headquarters industrial relations department from 1954 to 1957, when he joined the North Eastern Division as head of the Wages and Control Branch of the Industrial Relations Department, a post which he held until his present appointment.

Born in Aberdeen and educated in Dundee, Mr. Farningham, who is 37, served with distinction in the Fleet Air Arm during the last war and afterwards graduated in Philosophy at St. Andrew's University (Fife).

In the No. 1 (Worksop) Area of the North-Eastern Division, Dr. J. A. Scott, becomes Area medical officer on February 1. He is at present assistant Area medical officer for the No. 2 (Doncaster) Area. Mr. R. Fairhurst, formerly manager of Brookhouse Colliery, No. 1 (Worksop) Area, has been appointed agent manager of Manton Colliery, in the same Area and Mr. L. R. Cook, who was manager of Handsworth Colliery in the No. 1 Area, succeeds Mr. Fairhurst at Brookhouse.

In the No. 2 (Doncaster) Area, Mr. E. Pritchard has been appointed Area industrial relations officer. He was formerly wages and conciliation officer, Divisional Industrial Relations Department. Mr. D. Haigh has become Central Workshops manager for the No. 5 (South Barnsley) Area.

Lancashire Drive for Pit Recruits Extends to Liverpool

RECRUITING drive for miners in Lancashire has been extended to Liverpool, the North Western Divisional Coal Board announced on Tuesday. Several hundred men are wanted. When they are signed up, private buses will take them along the East Lancashire road to training centres and then to their work at pits in the East Lancashire and West Lancashire Areas. Under the board's assisted travel scheme, the maximum cost of the East Lancashire road lift to work will be 5s. 6d. per week for each man.

A Coal Board recruiting officer is interviewing the recruits at the main employment exchange in Liverpool.

A guaranteed working week, with no short time, holidays with pay, additional sickness benefits, concessionary coal and other welfare benefits, are offered.

Easing in Steel Demand

SIGN OF WEAKNESS IN SHEET SECTOR

DEMAND for many finished steel products, including plates, sections, reinforcing bars, and merchant bars continues to be strong and the mills have enough orders to ensure capacity working for several months at least, reports the Iron and Steel Board. However, signs of weakness in the home market for sheet, strip, and tinplate are appearing in the form of cancellation of orders and requests for deferment of deliveries, and the overall rate of ordering of finished steel has been a little below the rate of deliveries during the past few months.

Conditions in the export markets, states the board, are influenced by plentiful supplies available from other main producing countries, including the European Coal and Steel Community, the United States, and Japan, and any significant increase in exports from the United Kingdom during 1961 will have to be secured against keen price competition.

Supplies of raw materials for iron and steel making were generally adequate throughout 1960. Imports of scrap and pig-iron in 1960, which together totalled 460,000 tons, were on a much smaller scale than in other years, such as 1955 and 1957, when the steelworks were operating near to capacity. This resulted from a more than proportionate rise in the home production of pig-iron and from the use of the separate reserve of 200,000 tons of scrap, mainly from shipbreaking, set aside during 1959.

Quarterly Gains

In 1961 it is expected that scrap and pig-iron from home sources will be sufficient for all steelmaking requirements, apart from a minor import of scrap to meet certain problems of quality and distribution. Home and imported ores are also expected to be ample to meet all needs, including the requirements for the initial stocks at the new blast furnaces in South Wales, Scotland, and on the North-east Coast.

Comparative figures for crude steel production in each quarter of 1960 and similar periods of 1959 and 1957 (when the industry was also operating at a rate approaching full capacity) show gains of 9 per cent. and more on the previous best quarter. The first quarter gain was 12.8 per cent., the second 9.5 per cent., and the third 10.8 per cent., all over 1957. The fourth quarter was 9.6 per cent. better than 1959.

With the exception of Derbyshire, Leicestershire, Nottinghamshire, Northamptonshire, and Essex, South Wales and Monmouthshire, and the North-west Coast, all districts showed improved figures for steel ingot and castings output in December, compared with December, 1959. The Derbyshire district was 7 per cent. and South Wales 6.3 per cent. down; there was no change for the North-west Coast. Scotland showed the greatest improvement—16.4 per cent.

Imports of scrap and pig-iron for the years 1955, 1957, 1959, and 1960 (provisional) varied as follow:—Scrap, 1955, 1,270,000 tons; 1957, 660,000 tons; 1959, nil; 1960, 230,000 tons. Pig-iron, 1955, 670,000 tons; 1957, 320,00 tons; 1959, 100,000 tons; 1960 230,000 tons.

ISHRA Sells Remaining Shares in Steel Mill

ENTIRE remaining holding of its stock in the Darling & Simpson Rolling Mills, Limited, has been sold by the Iron and Steel Holding and Realisation Agency to Dorman, Long & Company, Limited, and to the Crittall Manufacturing Company, Limited, metal window manufacturers, of Braintree (Essex). The deal involves ISHRA's holding of £686,000 debenture stock, 1974-84, which has been sold for £571,095, plus accrued interest to the date of completion of the purchase.

Dorman Long, and Crittall Manufacturing, who each own 50 per cent. of the equity of Darlington & Simpson Rolling Mills, have each acquired half of the debenture stock now sold. The price of 83¼ per cent. at which the stock has been sold corresponds to a yield to the final redemption date of the stock (March 31, 1984) of just under 6.4 per cent. The agency states that the difference between this yield and the corresponding yield (6.1 per cent.) in the recent sale of the debenture stock of the Whitehead Iron & Steel Company, Limited, is the result of differences in the sinking fund arrangements, and thus in the average lives of the two debentures.

When steel was nationalized, the compensation paid for the share capital of Darlington & Simpson Rolling Mills was £1,178,497. Since 1954, the agency has received £1,063,592 from sales of these shares back into private ownership.

Nigeria Looks to British Iron and Steel Industry

DELEGATION from the Federation of British Industries, which is taking part in the Nigerian Development Conference at Lagos, heard the Nigerian Federal Minister of Commerce and Industry, Mr. Mallam Dipcharima, refer, among other things, to the possibility of developing an integrated iron and steel industry in Nigeria.

"We place great hopes in the establishment of these basic industries, and I trust that the British iron and steel industry will be able to show as much enthusiasm for this project as has been shown by the iron and steel industries of the US and Western Germany," he said.

Barclays Bank D.C.O., states that a team from Germany is reported to have arrived in Enugu, Nigeria, to carry out a survey on the feasibility of an iron and steel industry in the country's eastern region.

Local Rating's Effect on Industry

BURDEN of local taxation, which has drawn comment from a number of company chairmen recently, is also touched upon by Mr. G. J. W. Turner, chairman of Wrights' Ropes, Limited, in his annual report.

MR. G. J. W. TURNER

Remarking that it is not generally appreciated what industry has to pay in local taxation, Mr. Turner cites the example of Wrights' Ropes Birmingham factories, which now pay local rates seven times as much as those of four years ago. "This represents more than 10s. a ton on our products, which has to be recovered in our selling prices," he says. Net profit for the year fell from £141,902 to £74,021, after tax of £81,054—a result which the chairman describes as "most disappointing" and which he attributes largely to a serious setback to the Canadian subsidiary.

Home and export sales during the year were steady, but intense foreign competition caused a drop in selling prices oversea. Due to the difficulty in supplies of some types of steel, certain of the company's operations "have lived precariously on a day-to-day basis."

Changes in BICC's Oversea Organization

NUMBER of changes have been made by British Insulated Callender's Cables, Limited, in its oversea organization in London. Mr. C. Murray, with the title of general oversea manager, is responsible for the operations of the oversea organization and the co-ordination of its activities. Mr. C. A. Chidwick has become oversea manager, responsible for all BICC activities in Africa, the Middle East, and the Near East and will also deputize for Mr. Murray in his absence.

Mr. G. C. Knight has been appointed oversea manager with responsibility for Australia, New Zealand, Canada, the US, Central America, West Indies, South America, and Spain, Portugal, and Gibraltar. Mr. A. F. Coventry is responsible as oversea manager for BICC activities in Europe (excluding Spain, Portugal, and Gibraltar), India, Pakistan, Ceylon, and the Far East.

Mr. J. L. Woollett is regional manager for Canada and US, responsible to Mr. Knight. Mr. W. F. North, while continuing as secretary of the Telegraph Construction & Maintenance Company, Limited (TELCON), and Selbourne Plantation Company, Limited, and as general manager of Telcon Enterprises, Limited, has become personal assistant to Mr. Murray.

WEST GERMANY produced a record 34,100,000 tons of crude steel in 1960. Compared with 1959, production rose by 15.8 per cent., but the rise in costs was much less and raw material prices remained fairly steady.

Most Efficient Use of Manpower Needed

MAKE the most efficient use of manpower in 1961. That should be industry's main objective this year, advises the British Employers' Confederation in the latest issue of its bulletin. It warns firms that "provided we avoid major disputes, most grades of labour and all skilled grades are likely to remain indefinitely in short supply.

"Competition in world markets, on which we depend for our living, grows even keener. To meet this situation, Britain can no longer afford to employ three men on a job which can safely be done by two. Conversely, if three men are needed we cannot afford restrictions on the intake of men to a particular craft so that only two are available."

The bulletin points out that trade union leaders are ready to help increase productivity, but many of their members "still cherish the view that increased productivity means fewer jobs and harder work for those who remain. In a changing world there is still a reluctance to change. Re-deployment of a labour force tends to cause friction and industrial peace is worth a fairly high price."

Ore Imports Help South Wales Ports

INCREASED activity in the South Wales iron and steel industry was reflected in increased imports of iron ore through local ports in 1960, of 1,000,000 tons to 5,100,416 tons. Iron and steel goods rose by 345,000 tons to 502,254 tons. Exports of tinplate were up by 18,000 tons at 492,987 tons, although there was a drop of 166,000 tons in exports of iron and steel manufactures to 397,328 tons, and exports of coal, coke, and patent fuel fell by 108,000 tons to 2,644,912 tons.

Total traffic through the various ports in 1960 (with the corresponding figure for 1959 in parentheses) was as follows:—Newport, 2,430,522 (2,276,631) tons; Cardiff, 2,418,050 (2,262,358) tons; Barry, 1,310,288 (1,231,371) tons; Port Talbot, 3,712,679 (2,865,733) tons; Swansea, 8,066,695 (7,502,395) tons; Penarth, 371,293 (590,896) tons; Lydney, 27,734 (25,597) tons.

Steel Industry Expansion in Latin America

BRAZIL is expected to have a raw steel output by 1965 of 4,590,000 metric tons, compared with 2,600,000 tons in Mexico, 1,030,000 tons in Argentina and 870,000 tons in Venezuela. Production in Brazil in 1959 (the latest output figure) was 1,860,000 tons, while Mexican output was 1,180,000 tons. The other six producing countries in South America accounted for 980,000 tons.

Of steelworks at present under construction in Brazil, Cosipa and Usiminas will each be producing 500,000 tons annually by 1965, and Victoria 250,000 tons. By then, the Mannesmann plant, subsidiary in Brazil of the important German concern, will have trebled its annual production to 300,000 tons.

BRIGHTER DAYS AHEAD

Year of Consolidation for West Midlands NCB

MANPOWER was one of the really basic problems which faces the West Midlands Divisional Coal Board in 1961, Mr. H. A. Longden, the chairman, stated at a Press conference on Wednesday. During the first half of 1960 the monthly rate of loss of men was about 450, but by December the rate had declined to about 80 a month, and at the end of the year the division's manpower stood at 43,000. "Uneasiness about the future of coal mining and the very great demand for labour in the Midlands have been the basic factors leading to the run-down in manpower."

The compulsory retirement of men over 65 years of age, he pointed out, meant that of the men who left the pits in 1960, over 1,500 retired. "We are justified in hoping therefore that 1960 was the beginning of a halt in the drain on manpower and that all our efforts to check wastage are beginning to show results."

MR. H. A. LONGDEN

The 1960 recruitment figure of 4,780 was marginally above that of 1959 and of this figure, 3,390 were ex-miners. A particularly disturbing feature, Mr. Longden said, was the fall in the recruitment of boys under 18 to just over 630. The drop in manpower also governed and accentuated the speed at which output in the division fell in 1960. At 14,300,000 tons the output for the year was 10 per cent. lower than in 1959. Productivity rose by 5.3 per cent. at the face and by 3.7 per cent. overall. Mr. Longden commented: "This improvement is to a great extent due to the modernization programme we have in hand."

Increased Mechanization

One of the ways in which productivity could be improved and the level of output maintained despite falling manpower, was by increased mechanization at the coal face. In 1959 about 24 per cent. of output was power loaded. This rose to 27.6 per cent. on average in 1960, but towards the end of the year the proportion was substantially higher than average and it would continue to rise during 1961.

The sales of coal produced during the year rose by nearly 750,000 tons in the Midland region and the division as a whole sold 15,100,000 tons—an increase of 7 per cent. Stocks during the year fell by 1,100,000 tons to 2,100,000 tons of which well over half is industrial small coal. Consumption by power stations, coke ovens, and in the home rose, but the fall in industrial consumption was, Mr. Longden says, "mainly a reflection of changes to other fuels."

The most important challenge came from conversions to oil, he said, and although the markets lost to oil represented less than 1 per cent. of the division's output, the challenge was taken seriously and everything possible would be done to meet it.

He re-emphasized that manpower would be the biggest problem of 1961. One of the troubles over the last three years had been the lack of a feeling of security among employees. Many regarded the stocks of coal which had been built up as a sign that the industry was going down and down. "This stocking of coal has enabled us to keep the industry working five days a week and has given security to employees," he said. Pointing out that three quarters of the recruits in 1960 were ex-miners, Mr. Longden added: "We are looking forward this year to getting substantially more men back into the industry again. And we hope that we are going to kill any idea that the industry is running down. We would like to produce as much coal in 1961 as we did in 1960 and that is what we are setting out to do, but it depends on recruiting more men than we are wasting. At present we have 43,000 men to achieve the same output in 1961 as we achieved in 1960 with 6,500 more men. This is the key to the West Midlands maintenance of output in 1961."

Looking to the future, Mr. Longden said that by 1965 over 75 per cent. of the coal output of the division would come from new or reconstructed pits. The total capital expenditure by the board on development schemes between 1955 and 1965 would be about £100,000,000. In 1960 over £11,500,000 was spent on reconstruction. The division would just break even for 1960 in respect of profitability on colliery working, compared with a profit of about £200,000 in 1959.

Coal Consumers' Council to Report on Price Rises

SEVERAL meetings have been held recently by the Industrial Coal Consumers' Council to consider representations on behalf of the Federation of British Industries, the British Iron and Steel Federation, and others regarding last September's coal price increases, and to hear the National Coal Board's replies.

The representations cover the short notice given by the board of its intention to raise prices, the reasons for the board's need for additional revenue, the sharing of the burden between different types of consumer, and the effect of the increased prices on industrial consumers, on the British economy generally, and on the coal industry itself.

Appointments

Mr. G. A. Schofield Transfers to Littleton

IN succession to Mr. J. V. Cumberbatch, who was recently appointed group manager in the Cannock Chase Area of the West Midlands Divisional Coal Board, Mr. G. A. SCHOFIELD has been appointed manager of Littleton Colliery in the Area. For the past 3½ years, Mr. Schofield has been manager of Hilton Main Colliery, for two years before which he was manager of Walsall Wood Colliery. He had previously been reserve manager in the Cannock Chase Area for about six months.

From 1937 to 1954, Mr. Schofield worked at various collieries in the Yorkshire coalfield. He was undermanager at Elsecar Colliery in the North-Eastern Division at the time of his transfer to West Midlands. For his outstanding part and leadership in the rescue work at Walsall Wood Colliery in October, 1956, when five men were buried by a heavy fall of roof, he was awarded the MBE, the National Coal Board's Certificate of Bravery, and the Daily Herald Order of Industrial Heroism.

Mr. N. BARDSLEY has been appointed chief engineer of Plowright Bros., Limited, engineers of Chesterfield.

Formerly a field service engineer of Leyland Motors, Limited, Mr. P. M. KENNETT has been appointed sales engineer (western hemisphere).

Mr. NORMAN WELCH has been appointed sales manager of A. G. Wild & Company, Limited, manufacturers of equipment for rolling stock and collieries, of Sheffield.

Mr. E. O. CHARLTON has been appointed manager of the London office of W. H. Allen Sons & Company, Limited, in succession to Mr. F. A. B. Andrews, who has retired.

Formerly works manager at the Northampton works of Pollard Bearings, Limited, Mr. W. L. WATSON has now taken up a similar appointment at the principal works of the organization at Knottingley (Yorks).

Following the appointment of Mr. W. D. MORTON as assistant general manager of the Witton works of the General Electric Company, Limited, Mr. P. R. ARMITAGE has succeeded him as manager of the traction division.

Central marketing organization in Europe of the UK, German, and US companies of Stanley Works (G.B.), Limited, group—the Stanley European Marketing Organization—has appointed Mr. JOHN N. C. MOSS as marketing manager for southern Europe.

Mr. PETER G. HODGKINSON has been appointed to take charge of the production and operational research section of the British Shipbuilding Research Association. Until recently he was chief production engineer of de Havilland Aircraft Company, Limited.

Mr. COLIN MILLER, who has been with Thomas Smith & Sons (Rodley), Limited, since 1952, is leaving the firm to join the sales staff of Clyde Engineering Company, Limited, of Wellington, who are the agents for Smith cranes and excavators in New Zealand.

Mr. C. SMITH has been appointed assistant general manager of the ore mining branch of the United Steel Companies, Limited. He has been succeeded as group manager, underground mines, by Mr. F. HARRISON, who was previously assistant group manager, underground mines.

Martonair, Limited, manufacturers of pneumatic equipment, of Richmond (Surrey), has appointed Mr. M. R. TAYLOR as technical representative for East Staffordshire, Derby, Sutton Coldfield, and northern Birmingham. Mr. Taylor has spent several years in the technical department of the company.

Former manager of the Birmingham district of the Midland division of the Goodyear Tyre & Rubber Company (Great Britain), Limited, Mr. R. J. M. PERRETT has been appointed Bristol district manager of the Western Division. Mr. D. F. TOWERS has succeeded Mr. Perrett and his previous appointment as manager of the Nottingham district has been taken over by Mr. P. G. L. DRABBLE.

Miners Win Pay Increase of 8s. 6d.

PAY rises for mineworkers were agreed yesterday (Thursday). Daywage men are to get an extra 8s. 6d. a week and 55,000 craftsmen additions ranging from 11s. to £1 a week. The increases, which will now be put to the NUM branches for acceptance, will be back-dated to the beginning of the year.

It is estimated that the increases will cost some £7,500,000 and subsequent increases for pieceworkers may double this sum.

In negotiations with miners' leaders on Wednesday, the National Coal Board offered to raise the pay of 340,000 day-wage workers by 7s. 6d. a week and the rates of craftsmen by 10s. or 15s. according to skill, with another 5s. for specially qualified men. The cost would have been more than £7,000,000 a year, without allowing for consequential adjustments in piece-workers' pay.

The National Union of Mineworkers' negotiators rejected the offer and pressed for at least 12s. 6d. for day-wage men and 15s. or 24s. for craftsmen, with the same 5s. addition for special qualifications.

Slight Rise in End-year Wholesale Prices

PROVISIONAL Board of Trade estimates for December continue to show a slight increase in the general price levels of goods produced and materials purchased by manufacturing industry. In the case of manufactured goods, the increase, though small, is widely based, but, for purchases of materials and fuel, more basic commodities showed a weakening of prices as compared with the previous month.

The December price index for basic materials and fuel used in the manufacturing industry increased by 0.1 per cent. as compared with November. Fuel for industry showed a small fall in average prices, mainly due to the lower cost of industrial grades of coal. Among the basic materials used in production, some of the principal price increases were those shown in copper metal and manganese ore. Among the commodities which continued to decline in price during December were zinc, lead, and tin.

There was no change in the price index of materials and fuel used on mechanical engineering industries. In that sector, higher prices of copper and brass semis were balanced by lower costs of other metals and rubber.

Mr. ALBERT KIRK, secretary for 15 years of the International Twist Drill Company, Limited, Sheffield, has died at the age of 67.

Record Outputs, But . . .

STEWARTS AND LLOYDS FACES INCREASED COSTS

OUTPUTS of iron, ingot steel, and rolled steel products by Stewarts and Lloyds, Limited, in the year ended October 1, 1960, were a record and group sales rose by 18 per cent. to £139,000,000. Mr. A. G. Stewart, the chairman, reports that for the first time in any financial year dispatches of steel tubes exceeded 1,000,000 tons. Ironstone production rose by 15 per cent. to 5,064,000 tons —an increase due largely to increased consumption by the Corby blast furnaces.

Group profits, before tax, increased from £11,077,000 in the previous 53 weeks period to £18,241,000. Mr. Stewart points out, however, that since 1957—when the last major price change affecting the group became operative—increased costs in respect of wages, coal and coke, and freight charges have amounted to approximately £5,500,000 a year. "The effect on the company's profits has been mitigated to some extent by increased efficiency and plant modernization, but future profits will be affected by the full weight of these increased costs," he says.

Despite the fact that tube production created a new record with dispatches of steel tubes rising to 1,006,000 (833,000) tons and those of spun iron pipes and castings to 393,000 (333,000) tons, Mr. Stewart reports that some tube plants were not fully occupied.

Growing Foreign Competition

Sales to the oil and natural gas industries were 50 per cent. higher than in the previous year. This was the result, the chairman says, of greater success in securing orders and not from any increase in overall demand. Increasing competition and falling prices are affecting the export markets. "It is likely that our success in this direction will continue to depend to a considerable extent on our ability to meet finance and credit terms offered by our competitors," Mr. Stewart says.

On the development plan for the Corby steelworks, which has received approval in principle from the Iron and Steel Board, Mr. Stewart states that while few details are available, capacity of iron and steel production there is to be increased by 500,000 tons over the next three or four years. The company already has projects of over £20,000,000 on hand.

"SPECIAL FACTORS" OPERATED AGAINST FREDK. BRABY

CERTAIN "special factors" which have been operating against Frederick Braby & Company, Limited, makers of steel sheets, tanks, drums, etc., of London, E.C.1, are referred to by the chairman, Mr. F. C. Braby in his annual report. He criticizes Glasgow Corporation for its dilatory attitude regarding a transfer proposal to a new site at Kirkintilloch which led to labour and staffing difficulties and the undertaking of work at a serious loss.

The 1959-60 results, although disappointing, represented a very considerable improvement and could be taken to indicate the prospect of better things to come, after the elimination of the adverse factors referred to. The net loss was reduced from £172,576 for the parent to £55,792 for the group.

RTB Trading Results up by £4,500,000

MANUFACTURING and trading profit of the Richard Thomas & Baldwins, Limited, group, a subsidiary of the Iron and Steel Realization Agency, increased by £4,576,505 to £14,757,725 in the year ended October 1, 1960. A final dividend of 9 per cent. is recommended, again making a total of 13½ per cent. After depreciation and interest, but before tax, there remains a balance of £11,188,733 compared with £7,102,899.

Tax absorbs £2,311,482, (£2,980,814) and deducting subvention payments to an unconsolidated subsidiary, the net profit is more than doubled at £8,666,700 (£4,122,085).

The net profit available to the parent company is £8,537,073 against £3,989,272, of which the dividend takes £895,397.

Electrical Industry Invited to Share Export Effort

COMBINED sales efforts, market research, and collective oversea exhibitions with makers of complementary equipment may follow a meeting in London on Tuesday of export managers and executives in the electrical industry. The industry's exports now approach £300,000,000, and the meeting welcomed the suggestion that its trade association, BEAMA, should arrange to put firms in touch with these manufacturers with this aim in view.

Replying to a confidential questionnaire, firms will be asked to give details of the product they wish to export, the oversea territories in which they would like to co-operate, any existing oversea facilities they would be prepared to share, and whether they would like to co-operate with firms in other industries.

THIRTIETH ANNIVERSARY of the Institution of Works Managers will be celebrated with a conference at Bournemouth from April 21 to 23 to discuss international aspects of works management. Foreign speakers will include Dr. Christian Gasser, chairman and president of the Mikron Machine Works, Switzerland, Mr. Folke Halden, director of the Swedish Employers' Confederation, and Mr. R. B. Dunlop of the USA, director of D.P. Manufacturing. Sir William Garrett of the British Employers' Confederation, and Mr. W. J. Carron, chairman of the British Productivity Council, will be among the British speakers.

Law Cases

Eight Men Accused in Steel Company Thefts

STOLEN tools were found at the store of a construction company with contracts at the Abbey Works of Steel Company of Wales, Limited, at Port Talbot (Glam), it was stated at Port Talbot Magistrates' Court. Mr. Joseph Marsden Jenkins (54), managing director of the Skewen Construction & Maintenance Company, Limited, Neath (Glam), and the site agent, Mr. Richard Hubert Davies (50), faced five charges of larceny of the Steel Company of Wales' goods totalling £186. There were five alternative charges of receiving against the two men. The charges against Mr. Jenkins were dismissed. Mr. Davies was sent for trial at Glamorgan Assizes on four charges of receiving properties alleged to be stolen.

The magistrates adjourned until Tuesday charges of jointly stealing 1,480 tons of mild steel plate and joists, valued at £66,621, the property of SCOW, against Mr. Richard Hubert Davies, Mr. Edward John Williams (43), general foreman, and Mr. Dilwyn John James (37), lorry driver. The men were remanded on bail.

A case in which four men are charged with stealing 246 tons of steel plate, worth £11,095, from SCOW, was also adjourned until Tuesday. The accused, Mr. Cyril Cowell (36), site agent, Mr. Harold Wilkins (28), lorry driver, Mr. Peter Edward Thomas (36), lorry driver, and Mr. Glyndwr Davies (32), clerk, were remanded on bail. Mr. Edward John Williams, Mr. Dilwyn John James, and Mr. Richard Hubert Davies, were also charged with stealing 5 tons of mild steel worth £230, and were remanded on bail until Tuesday.

Another charge to be heard on Tuesday will be of forging a repair order, against Mr. Dilwyn John James. Mr. Richard Hubert Davies will be charged with aiding and abetting. Prosecuting counsel said there were 29 other offences of a similar nature.

INADEQUATE EYE PROTECTION

PROTECTION of workers' eyes was not taken seriously in the machine shop of J. Brockhouse & Company, Limited, West Bromwich, at the time of an accident to Mr. Matthew Thomas Angus, a horizontal borer. This was maintained by Judge E. G. H. Beresford at West Bromwich County Court when he awarded £55, including £5 special damages, with costs to Mr. Angus for eye injuries he received while sharpening a tool on a grinding wheel at the works.

The plaintiff maintained that no protective goggles were provided, although he had tried to obtain some for the machine shop. For the company, Mr. W. N. Davison said that a visor was available, to which Mr. Angus replied that he would rather have no protection at all than use a visor which was "big and clumsy."

MINER BURNED "RAW COAL"

FINE of £2 was imposed by Nuneaton Borough Magistrates on Walter West, a miner, of Nuneaton (Warwicks), who pleaded Guilty to emitting smoke from his home in a smoke-control area. West admitted burning raw coal, which was not an authorized fuel under the Clean Air Act.

Mr. R. F. Kent, prosecuting, said that West stated that he had been burning coal since the Act came into operation (July), and he intended to do so until satisfactory arrangements were made between the miners and the NCB about concessionary coal. West said in court that he raised the question with his union and at the colliery where he worked and was told to burn his coal.

CLAIM for damages by Mr. Patrick O'Grady (48), a fitter at the Cardiff works of the Guest Keen Iron & Steel Company, Limited, was dismissed at Cardiff County Court. He claimed that he crushed a finger after falling while repairing the girder work of a furnace.

HEARING of the reference by the Registrar of the agreement between members of the Cement Makers Federation began in the Restrictive Practices Court on Monday. The agreement provides for fixed prices of cement, deferred rebates to users based on their aggregate purchases, and rebates for merchants on the federation's list.

CHARGE of disorderly behaviour against two miners employed at Bentley Colliery, Mr. Boleslaw Slusarczyk (46), and Mr. Jerzy Homa (33), was dismissed by Barnsley Magistrates when the chairman, Mr. A. E. Emberton, said there was sufficient doubt in the minds of the magistrates. Counsel for the NCB alleged the two men were involved in a fight underground.

AFTER A HEARING lasting 25 days, the Restrictive Practices Court (Mr. Justice Russell, Sir Stanford Cooper, and Mr. W. L. Heywood), reserved judgment in the reference of the price-fixing agreement between members of the Transformer Manufacturers' Association. In his final speech on behalf of the association, Mr. B. MacKenna, QC, said that the abolition of the agreement would bring transformer prices down to an unreasonable level which would be detrimental to customers.

Managers Appointed for West Midlands NCB

MR. A. SMITH has been appointed manager of Hilton Main Colliery in the Cannock Chase Area of the West Midlands Divisional Coal Board, and Mr. T. E. Smales has been appointed manager of Wimblebury Colliery in the same Area. Mr. Smith, manager of Wimblebury Colliery since 1957, entered mining as an apprentice in 1924, and was undermanager, before nationalization, with the Seghill Colliery Company, Limited, from 1942 to 1945. For the next 12 years he was manager of Brereton Colliery, Cannock Chase.

Mr. Smales entered the industry in 1945 and later gained a B.Eng. degree in mining at Sheffield University. He was appointed manager of Manton Colliery, in the No. 1 (Worksop) Area of the North-Eastern Division in 1955, and two years later became agent-manager of Florence Colliery, North Staffordshire Area. He was manager of Hawkins Colliery, Cannock Chase, until it closed last year, since when he has been manager of Cannock Chase No. 8 Colliery.

Tredegar Dislikes NCB Proposal to Move Offices

"VEHEMENT" protest against the closure of the National Coal Board's offices at Tredegar (Mon) is to be sent by Tredegar Chamber of Trade to No. 6 Area general manager, South-Western Divisional Coal Board and Mr. Michael Foot, MP for Ebbw Vale. It is stated that the proposed transfer of the offices to Six Bells (Mon) would cause hardship for many of the 50 clerks employed at Tredegar.

Electronic Weighing in Steelworks

ITS APPLICATION IN A MODERN LD PLANT

by C. P. A. de Meer

(Research Laboratories, Royal Netherlands Blast Furnaces & Steelworks, Ijmuiden)

The use of electronics in steelworks is increasing steadily, one recent and valuable application being to the long-standing problem of rapid routine weighing of the large quantities of the varied materials that constitute a steelmaking charge. In this paper the author describes the successful development and use of load cell weighing equipment on the modern LD plant of the Royal Netherlands Blast Furnaces & Steelworks.

WHEN the Royal Netherlands Blast Furnaces & Steelworks adopted the LD process for making low-carbon steels it was decided, at the outset, to equip the plant with modern instrumentation techniques in order to obtain the same degree of control of steel production and quality as with the open-hearth process in spite of the greater speed of the LD process.

Each melt of steel in the LD converter requires liquid iron from the blast furnaces, scrap steel, and small additions of millscale ore, limestone, lime, and calcium fluoride. Much of the instrumentation would therefore be concerned with the measurement of weight and it was considered desirable that a degree of automatic control should be incorporated in the routine equipment in order to allow the operator to concentrate on the process itself.

Use of Load Cells

The use of load cells for all weighing was decided upon because (*a*) they are very robust and if the weighbridge is properly built it is not easily damaged by the impact of loading; moreover, in the event of damage, replacement of the load cells calls for no special skill; (*b*) the load cells are unaffected by dirty and dusty surroundings; (*c*) the electrical signals obtained from the loadcells can be readily used for further operations such as remote control, recording, and digital representation; (*d*) recent developments have made the accuracy of load cells at least equal to that of conventional weighing equipment.

A digital representation of the weighing results was preferred because (*a*) it gives little chance for errors of reading; (*b*) it requires much less space in a measuring panel than an analogue representation of the same accuracy; (*c*) it enables either recording on a typewriter or data collection on a punched paper tape to be easily carried out.

The punched tape method gives the data in a form which can easily be used for statistical research.

Two installations will be discussed here, the hot-metal weighbridge and the system for weighing and adding of the fluxes.

THE HOT-METAL WEIGHING SYSTEM

Weighbridge Equipment

Fig. 1 is a diagram of the hot-metal weighbridge. It consists of a rigid framework supported

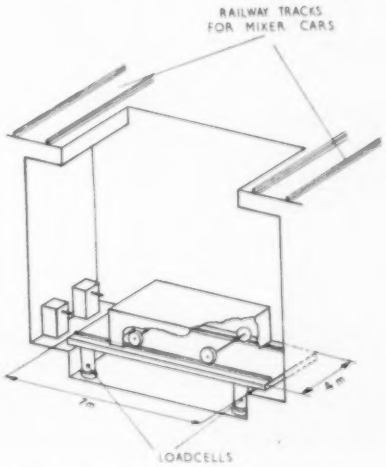

FIG. 1.—HOT-METAL WEIGHBRIDGE.

on four load cells at the corners and having a short length of track, carrying a bogie. The weighbridge is about 7 m. long and it is situated at the bottom of a pit about 6 m. deep. On either side of this pit at shop level there is a standard railway track. A hot-metal torpedo car holding up to 200 tons of liquid iron is brought from the blast furnace some 2 km. away and shunted on to the tracks on either side of the weighing pit. A ladle is lowered by crane into the pit on to the bogie, which is then driven to one or the other side of the weighbridge to receive the liquid metal.

The torpedo car is then rotated and liquid metal is poured into the ladle. This is shown in Fig. 2. The weight of the bridge and the bogie together is about 30 tons, whereas an empty ladle weighs approximately 25 tons. Up to 60 tons of liquid iron can be poured into the ladle at any time.

Since the bogie, the ladle, and the liquid iron can be positioned to one side or the other of the weighbridge, it was necessary to install four load cells each with a weighing capacity of 50 tons. The capacity of the weighbridge therefore was 200 tons, although the maximum total load placed on the load cells at any time was of the order of 120 tons. Fig. 3 shows a load cell in its position below the weighing platform.

Fig. 4 is a block diagram of the weighing system for the hot-metal weighbridge. The four, 50-ton precision loadcells have sufficient surface area on their proper weighing cylinders to bond two sets of electric resistance strain gauges to them. Each set of strain gauges, comprising eight individual gauges, was wired to form a temperature-compensated Wheatstone network whose output was accurately proportional to the applied load. One set of gauges on each of the load cells was used with a self-balancing potentiometric indicator to give an approximate indication, to the 1 per cent. level, of the load on the weighbridge. This indicator can be seen in the top right-hand corner of Fig. 5.

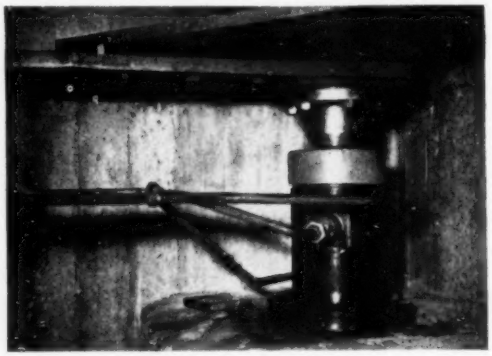

FIG. 3.—LOAD CELL IN POSITION BELOW HOT-METAL WEIGHBRIDGE.

When the empty ladle is placed on the bogie of the weighbridge by the crane, the weighbridge operator is able to set the point of the self-balancing potentiometric indicator to zero by turning the knob of a resistor mounted on the front of the indicator. When the indicator is set to zero, the weight of the liquid iron added to the ladle may then be observed continuously throughout the filling operation. The signal from the second set of strain gauges is used for the precise measurement of the loads on the weighbridge.

Accuracy of Weighing

One of the difficulties associated with the measurement of load by electric resistance strain gauge load cells is that it is not easy to measure the output to a very high order of accuracy, although the output itself may be accurately proportional to the load applied to the load cells.

In practice, a self-balancing potentiometric indicator or recorder must be used and these instruments are rarely accurate at any load to nearer than 0.25 per cent. of their maximum indicated load. In a system, therefore, designed to measure 100 tons it would not be possible to indicate or record more accurately than $\pm$ 0.25 ton, since the self-balancing potentiometric instrument could not be made to a higher degree of accuracy. In this installation, therefore, arrangements have been made for scale expansion and at the same time certain other features have been incorporated in the equipment.

The self-balancing potentiometric recorder used in this

FIG. 2.—HOT-METAL WEIGHBRIDGE DURING FILLING OF A LADLE.

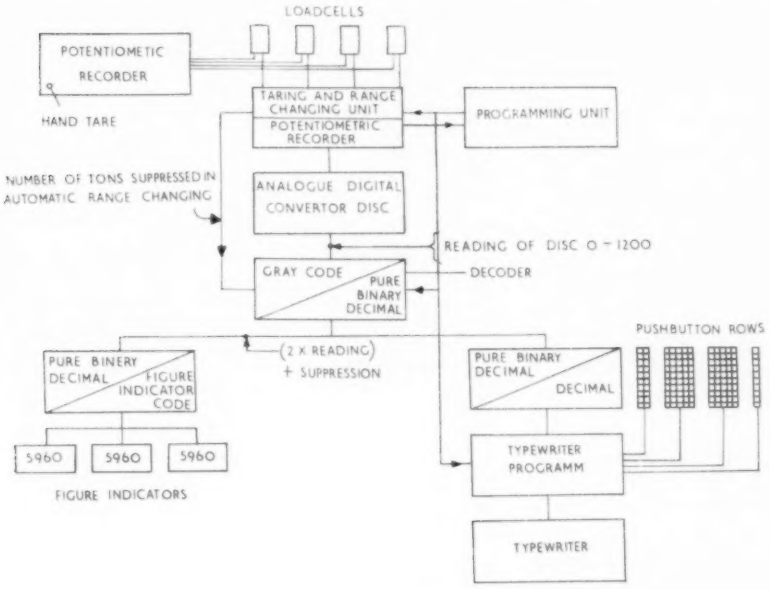

FIG. 4.—BLOCK DIAGRAM OF HOT-METAL WEIGHER.

equipment has a span equivalent to a load on the load cells of 24 tons. The programming under the control of the weighbridge operator is carried out by push-buttons as follows:—Before a ladle is placed on the weighbridge, an automatic taring unit sets the pointer of the potentiometric recorder accurately to zero. The ladle is then placed on the weighbridge by the crane and when sufficient time has elapsed for the potentiometric recorder to indicate the weight of the empty ladle, its weight is printed out, and the automatic tare operates again to bring the pointer of the recorder to zero. Liquid metal is then poured into the ladle and during this process the pointer of the recorder will follow the change in weight.

When the contents of the ladle are about 23.5 tons the automatic range-changing unit subtracts from the incoming electrical signal from the strain gauges a reference potential accurately equivalent to 20 tons. This reference is obtained from a network of four precision resistors supplied from the source which supplies the loadcells and the potentiometric recorder. The pointer of the recorder therefore travels back to indicate 3.5 tons, that is, the difference between the actual 23.5 tons signal and the signal of 20 tons from the reference network.

When the total weight of the contents is equal to approximately 43.5 tons the process is repeated, and this time a reference signal accurately proportional to 40 tons load is subtracted from the incoming load cell signal. A total of four signals can be given, accurately proportional to 20, 40, 60, and 80 tons and is obtainable from the reference network so that the total weighing range of the indicator is equal to 104 tons net. On the other hand, the accuracy of the potentiometric recorder is equal to $\pm$ 0.25 per cent. of 24 tons, that is, to approximately 60 kg. It has been found that over periods of two to three months the accuracy of the equipment is in fact $\pm$ 80 kg.

The total weight of liquid metal in the ladle, therefore, is the summation of the equivalent "load," offset against the strain-gauge signal, from the reference resistors together with the incre-

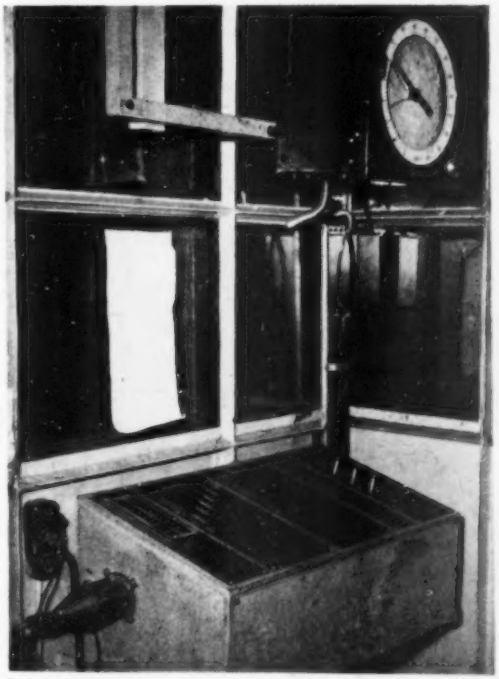

FIG. 5.—OPERATOR'S PULPIT FOR HOT-METAL WEIGHER.

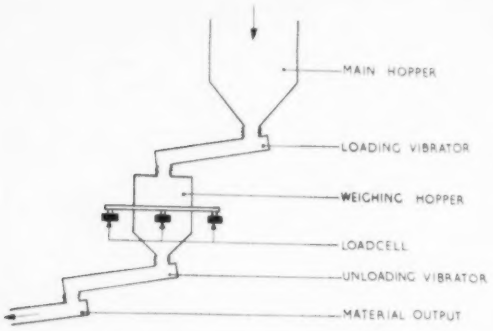

FIG. 6.—LOADING AND UNLOADING OF A HOPPER.

ment shown on the scale of the self-balancing recorder.

The load indicated on the scale of the self-balancing potentiometric recorder is digitized by means of a disc driven directly from the shaft of the instrument which drives the balancing slidewire. The disc is printed with a form of the Gray code (a cyclic progressive binary coded decimal) which divides the total movement of the pointer of the potentiometric recorder into 1,200 equal increments.

The decoder incorporates a scale-of-two in the output so that printout covers the range of 0 to 2,400 in steps of two. The increment of load indicated by the pointer of the self-balancing recorder is added to a digital signal generated from relays, switching the reference resistors; the resulting signal is transmitted to two translator units.

One of these translator units distributes information on the weight of the load on the weighbridge to three locations in the steelworks for the information of personnel. One of these information points is on the desk of the weighbridge operator and can be seen on the top right-hand corner of his pulpit in Fig. 5.

The second translator unit processes the digital information into a form suitable for recording by means of an electric typewriter. A recording in the form given below is made on this typewriter for each weighing cycle.

The information is obtained either from the load cell weighing equipment or from push-buttons on the operator's desk.

Typical values recorded are as follow:—Indicated weight after completion of taring of empty weighbridge, 000 (100's kg.); code number of the ladle, 12; weight of ladle, 256 (100's kg.); indicated weight after taring with ladle on weighbridge, 000 (100's kg.); weight of liquid metal in the ladle, 5,960 (100's kg.); tap number of the blast furnace, 36,825; charge number of the melt in oxy-steel works, 328; converter number, 2.

Performance of the Weighbridge

The liquid-metal weigher has now been in service for over two years and it has worked with complete satisfaction during this period. The reproducibility and linearity of the accurate measuring system is within ± 80 kg. and this referred to the total weighing capacity of the load cells, indicates an order of accuracy of within ± 0.05 per cent. Some difficulty was experienced when starting up the installation due to a zero drift in the measuring circuit which was eventually found to be due to temperature fluctuations in the cabling used for interconnection between load cells and the measuring system. After it had been replaced by heavy rubber insulated cabling, the drift was removed and it has not reoccurred.

It is interesting to note that several months after the unit had been in operation a weight of 18 tons, which is used for calibration purposes, was dropped from a crane directly into the corner of the weighbridge from a height of 1.5 m. The load cell at that corner was damaged, but was replaced by a spare unit in a few hours. This is an important point and it demonstrates that when using load cells with strict linearity the

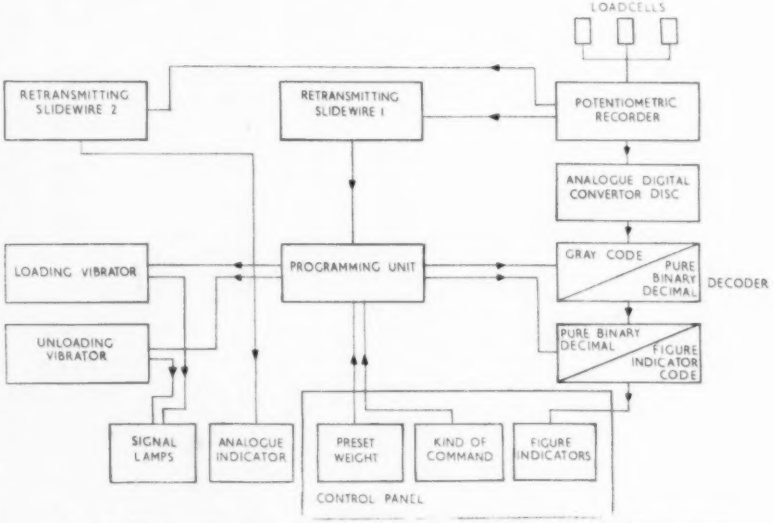

FIG. 7.—BLOCK DIAGRAM OF INSTALLATION FOR WEIGHING AND DISPENSING OF THE ADDITIONS.

measuring circuitry can be simple enough to replace load cells by spares without a tedious recalibration of the circuit to adjust for non-linearity in the load cells themselves. A set of pre-loaded springs will be installed in the weighbridge, so, in future, eventual heavy shocks on the weighbridge will be absorbed in the springs.

SYSTEM FOR WEIGHING AND ADDING FLUXES

Calculation of Additions

In any converter process, and especially in the LD process, it is extremely difficult to measure the temperature and determine the composition of the steel during the process, as is done in open-hearth steelmaking. Hence, in order to arrive at a certain specification of temperature and analysis of steel, it is imperative to have a rigid control over all the input variables.

Because no external heat is supplied to the system the final tapping temperature in the converter process should follow from the total heat balance as constituted by the sensible heats of the ingoing and outgoing components, the heat of the oxidation reactions and the heat losses in the converter and the stack gases.

It is clear from the many variables appearing in this heat balance that the necessary quick calculations cannot readily be made from graphs and for this reason an analogue simulator has been constructed which makes it possible to calculate with sufficient accuracy and speed the unknown terms in the equations in order to arrive at the proper total steel weight, analysis, and temperature.

The Weighing Hoppers

There are a number of additions to be made to the converter during the heat and there are five installations to handle these. Before starting the process the quantities of materials needed, calculated by the simulator, are weighed and stored in small weighing hoppers. The quantities dispensed are between 0.5 and 6 tons.

During the process the weighing hoppers are unloaded in several variable pre-set quantities. The loading and unloading of the weighing hoppers is carried out with vibrators shown schematically in Fig. 6. The vibrators are controlled by the dispensing and weighing installations.

The complete installation for adding fluxes operates by push-button control, so requiring a minimum of attention and time from the operators. Fig. 7 is a block diagram of a dispensing installation. The hopper is placed on three toroidal load cells, the signal of which is measured with a potentiometric recorder.

A coding disc of similar type to that used in the hot-metal weigher is mounted in the recorder. The disc is divided into 1,000 divisions and the digital result of the weighing operation is obtained in the same way as in the hot-metal weigher. The scale factors used in the decoders of the different installations are 1-2-3 and 5. The figure indicators are mounted on a small control panel in the converter cabin. From this panel a complete installation can be controlled with push-buttons.

A programming unit controls the different actions required during loading and unloading the weighing hopper. From the control panel the following instructions can be given:—(1) Load hopper to a pre-set value; (2) discharge hopper with a pre-set value; (3) discharge hopper completely independent of any pre-set value; (4) stop the current cycle of operation and cancel the previous order.

On the same control panel four rows of 10 push-buttons marked 0 to 9 are mounted. With these buttons the operator can give the pre-set value for the loading or discharging action. The push-buttons remain in the impressed position till the movement of material is finished and are then reset electrically. A coarse analogue indicator informs the operator about the progress of an action going on, while two small lamps indicate whether a vibrator motor is energized or not.

The programming unit receives information from the control panel about what has to be done and about the contents of the hopper by a retransmitting slidewire built into the potentiometric recorder. It also switches the motors of the vibrators on and off.

Control Equipment

Fig. 8 shows the control panels in their position in the converter operating cabin. The four kinds of orders mentioned above are put into effect

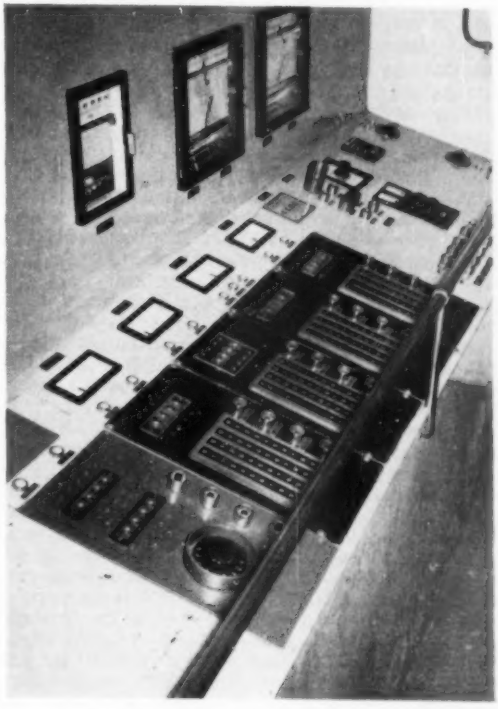

FIG. 8.—CONTROL PANELS IN OPERATING CABIN.

with the four buttons on the right-hand side of each panel. The weights required are selected by the four rows of push-buttons. As an experiment, the push-buttons on the panel in the lower centre part of the photograph have been replaced by a telephone dial, which seems to give less mechanical trouble. In this case the weight selected with the dial is stored in a relay memory till the loading or discharging action is finished. During that time the dialed number is displayed on a second set of figure indicators. Over the control panel the two signal lamps and the coarse analogue indicator are visible.

The measuring circuit is of similar accuracy to the weighing system of the hot-metal weigher; the weighing accuracy reached is about 0.25 per cent., being the accuracy of the potentiometric recorder. The digital part of the system is simpler than that of the hot-metal weigher, for no adding is necessary. Space is reserved so that later the output of the decoder can be fed into a code converter to obtain either decimal or telex code depending on the typewriter used in connection with the installation.

The equipment in the pre-set circuit has a digital input for the sake of simple and accurate input by the operators, but later it works on an analogue basis. Accuracy is limited by pick-up in the cables from the control panel to the programming unit, but this pick-up could be avoided by working through the whole installation with digital quantities. The analogue method is, however, much simpler and is still sufficiently accurate.

The experience with the equipment over the last two years is satisfactory. Apart from the drift difficulties as mentioned in connection with the hot-metal weigher, no further problems have been encountered. In particular, the relays, of which 400 are used, do not give any trouble and maintenance on the whole installation is very small, in spite of the severe conditions under which the installation has to work.

Acknowledgments

The author wishes to thank the directors of the Royal Netherlands Iron & Steel Works for their permission to publish this paper and also Dr. R. B. Sims, of Davy & United Instruments, Limited, for his valuable assistance in its preperation.

ENGLISH ELECTRIC ACTIVITIES IN 1960

SECOND order for a large civil atomic power station has been entrusted to the consortium of the English Electric, Babcock & Wilcox, and Taylor Woodrow Atomic Power Construction Company, Limited, it is stated by the group in reviewing activities during the past year. The plant is to be built at Sizewell on the Suffolk coast and will have an electrical output of 580MW, making this the seventh and the largest of the UK atomic power stations.

During the year hydro-electric plant manufacture has been reorganized and concentrated at the Netherton Works, near Liverpool. Orders have been received from Hidroelectrica Espanola for three 108,000-h.p. reversible pump/turbines and motor generators for Valdecanas, and for four 36-MVA generators for Torrejon on the river Tagus in Spain, downstream of Valdecanas.

Orders for water turbines include two 70,000/85,000 h.p., 334/426 ft. head Francis turbines for the Trinity power plant of the United States Bureau of Reclamation.

Regarding steam turbine equipment, the year witnessed an increasing trend towards large sets of advanced design. Of the orders placed with the English Electric Company by the CEGB, the contract for Britain's first 375-MW supercritical machine marks an important stage in the development of the modern steam turbine. This 375-MW, 3,000-r.p.m. set, ordered by the CEGB for its Drakelow "C" station, is a single-line tandem machine. The turbine will operate with steam at the advanced steam pressure of 3,500 lb./sq. in., 1,100 deg. F., reheat to 1,050 deg. F., with a vacuum of 28.7 in. Hg. The alternator will have a water-cooled stator and a hydrogen-cooled rotor and will generate at 19,000 volts. Another important contract awarded to the company by the CEGB was for two 350-MW units for its Blyth "B" power station. The alternators will be of the direct-cooled type, also employing a water-cooled stator and a hydrogen-cooled rotor, the gas pressure being 45 lb./sq. in. Generation is to be at 19,500 volts.

Orders for oversea included a third 200-MW reheat unit for Vales Point, Australia, and a repeat order for a 30-MW alternator set for Hex river power station in South Africa. Commissionings during the year included three 6,500-kW sets for the South Durham Steel & Iron Company, Limited, West Hartlepool works, so that in all 11 English Electric machines are now in operation at this company's works. The twelfth set, ordered during 1960, is a 10,400-kW unit.

FIRST BLOWN IN during 1922, No. 3 blast furnace at the Newcastle (New South Wales) steelworks produced over 7,750,000 tons of iron up to the end of 1959. During its long life it was relined five times, and underwent major repairs in 1950. In January, 1960, it was demolished and completely rebuilt as a larger furnace with the most modern equipment. New capacity of the furnace is 1,000 ton/per day, the hearth diameter having been increased to 20 ft. The whole job was completed in 15 weeks between January and April.

COAL PLOUGHING
at Sneyd Colliery
Installations in the West Midlands

By R. BOOTE*

Installation details and operational results of two plough installations are given in this paper. The first installation, in the Bullhurst Seam, was made in a newly developed face, while the second, in the Banbury Seam, replaced an existing flight-loading unit. A plough, fitted with swivelling pre-cutting blades, was installed in the Banbury Seam in order to control the plough in the vertical plane. The paper was presented to the North Staffordshire Branch of the National Association of Colliery Managers on September 16, 1959.

COAL ploughs in their various forms were introduced to British mines shortly after 1945. The principle, first employed in West German collieries, where the coal is generally softer than in Great Britain, is to use a planing machine with several cutting blades, to shear off a number of narrow cuts as distinct from the usually deep cut of 4 to 6 ft. taken by conventional coal cutters. This planing machine, called the plough, is pulled along the front of the coal by a powerful chain, and the coal is loaded, or falls on to an armoured conveyor, which, with the aid of hydraulic rams, holds the plough up to the face.

Several types of ploughs have been developed, and the most popular one is the Anbauhobel which is a combination of coal getting, coal loading, and conveying, all working together as a complete unit. Its sphere of application comprises working faces with seam thicknesses from about 2 ft. to 8 ft., having a reasonably strong floor, and good roof, or coal parting.

The plough travels along the face at a speed of 75 ft./min. and is guided by a base plate passing under the conveyor and by guide tubes attached to the conveyor. Distance pieces regulate the cutting depth from 1½ in. to about 3 in. and the coal, loosened by the bits, is loaded by the plough shaped body on to the armoured conveyor.

The Anbauhobel, consisting of both the complete equipment and conversion equipment, is the type installed and in use at Sneyd Colliery, North Staffs Area, West Midlands Divisional Coal Board, where ploughs have been installed at No. 14s Bullhurst and No. 27s Banbury faces. The total cost of the equipment in both cases, including roof supports, signalling, telephones and switchgear, was approximately £56,000.

* Agent/manager, Florence Colliery, North Staffordshire Area, West Midlands Divisional Coal Board.

Bullhurst 14s Face

During April, 1958, work commenced on the development of a third face in the Bullhurst Seam. The two previous faces had been worked successfully; on the first one, by prop-free-front hand filling, followed by flight loading, and the second face by flight loading from the commencement.

It was originally intended to work the third face by flight loading following the previous pattern. However, degradation of the product, in some cases 16 per cent. worse than conventional hand filling, was being caused by flight loading in the friable Bullhurst Seam. Efforts were being made to increase large coal production and it was decided to try out ploughing equipment which was available in the Area.

The Bullhurst Seam at Sneyd Colliery is 6 ft. 6 in. thick, being a good quality fairly high rank coal. It has a very hard floor from which the coal parts readily, and a "hustle" parting 15 in. from the roof. The coal is worked to this parting, giving a working height of 5 ft. 3 in., and some top coal is recovered from the wastes. The coal is friable with well-defined cleat lines and it was considered that ploughing would be successful.

Bullhurst 14s face was developed about 900 yd. from the pit bottom with two 36-in. dip belts already installed to carry the coal from the 30-in. gate belt, to the loading point in the pit bottom. It was decided that the most suitable length of face would be 150 yd., which, with a deepside of 10 yd., would yield about 500 ton/day, or 2,500 tons weekly. The face lay at the full dip inclination of 1 in 5, at a depth of approximately 900 yd. from the surface at the main gate.

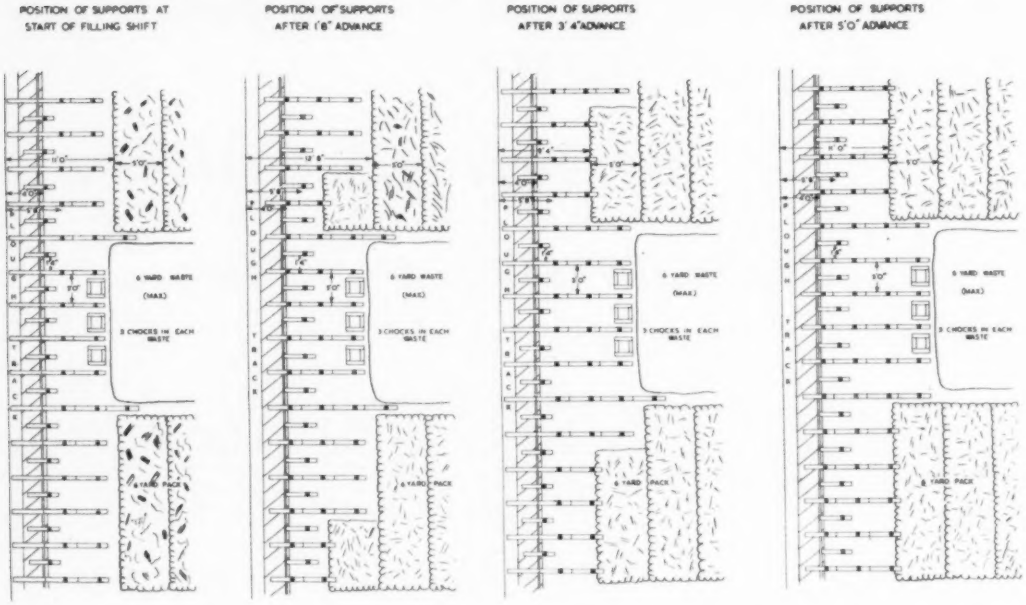
POSITION OF SUPPORTS AT START OF FILLING SHIFT
POSITION OF SUPPORTS AFTER 1'6" ADVANCE
POSITION OF SUPPORTS AFTER 3'4" ADVANCE
POSITION OF SUPPORTS AFTER 5'0" ADVANCE
6 YARD WASTE (MAX.)
3 CHOCKS IN EACH WASTE
6 YARD PACK

FIG. 1.—METHOD OF SUPPORT AND OPERATION FOR NO. 14 BULLHURST ANBAUHOBEL LOADED FACE.

A conventional 12-in. Cowlishaw Walker chain conveyor was used when heading out the face, and Dowty Monarch props with 7-ft. corrugated bars were set as the face heading advanced, the intention being that this type of support would be used when flight loading started.

The preparation of the face heading was nearing completion when it was decided that ploughing would be adopted. Metre link bars were then set with the Dowty props and the existing 7-ft. corrugated bars taken off and replaced with metre bars.

During this time the plough machinery had arrived, and a shortened version of the complete equipment was built up at the surface and run so that those who were to work the face could be acquainted with the new method.

As soon as the face heading was thirled, all development men were put on the job of dismantling and removing the development conveyor, and installing the Anbauhobel equipment, which had been sent into the district, special attention being given to sending it down in the proper order. During the installation period valuable assistance

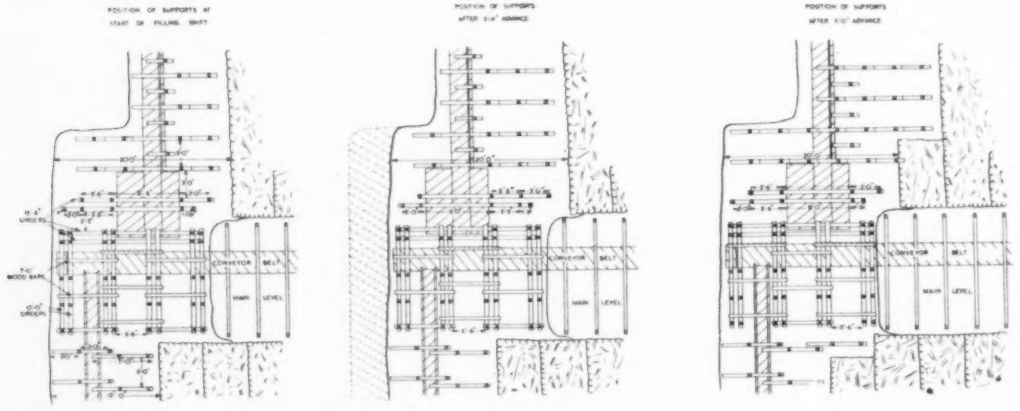

FIG. 2.—SYSTEMATIC SUPPORT OF THE MAIN STABLE FOR NO. 14 BULLHURST INSTALLATION.

was given by members of the Area mechanization team and service engineers from the manufacturers and also the work was supervized by two overmen, who spared no effort to get the job going. Transport of the equipment occupied at least three-quarters of the manpower of the whole job. The time taken from the start to completion of the installation was about two weeks and 200 manshifts were employed, including pit fitters, electricians, and officials.

Experimental ploughing was commenced during September, 1958, the original development team of 12 men being used to man the face. When the face had advanced 10 ft. and the timbering system established, it was stopped, while three steel chocks were installed in each waste according to the support plans shown in Fig. 1. The roadside packs were not less than 10 yd. long.

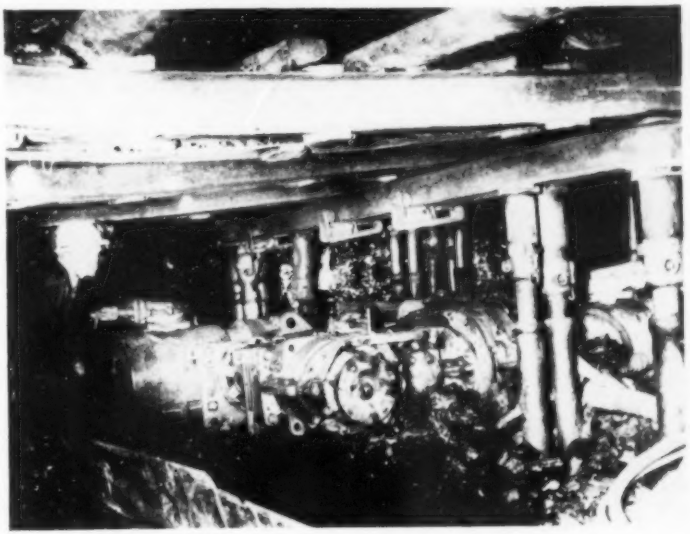

FIG. 3.—MAIN GATE SUPPORT SHOWING THE ROLLER BRACKETS TO FACILITATE THE SETTING OF THE 15-FT. GIRDERS.

The support system, shown in Figs. 1 and 2 was based mainly on a similar system which had been found suitable for a disc shearer face in the Yard Seam which had extremely poor roof conditions. The fact that a row of supports could be moved up every 20 in. meant that the density of support was always greatest just behind the conveyor. The roadhead support was also established, using double girders 15-ft. long over the driveheads, and which also support the free ends of the double girders across the roadhead. A system of roller brackets (Fig. 3) is used to facilitate the movement of these heavy 15-ft. girders forward in alternate 5-ft. steps. The face support and roadhead plans were submitted to the Inspectorate, which fully approved them, without alteration.

Face Personnel

A flight-loaded face in the Banbury Seam was due to finish by the end of 1958 and the men from this face were chosen to work the new plough face.

The team chosen and agreed with the NUM was as follow:—

Plough and rams	2
Timberers (three teams, of two men each)	6
Packers	12
Waste drawers and drillers	4
Stables (two men, three shifts)	6
Top level rip	5
Main level rip	5
Total	40

In addition, there were two men on a separate contract preparing the deepside. Pulsed infusion shotfiring was used to prepare the deepside and stables. Also various other daywage face men were required to complete the team.

Therefore, the agreed total manpower for the face was as follows:—

Power-loading Team	
Ram and plough attendants	2
Timberers (three teams, of two men each)	6
Top stable men	3
Bottom stable men	3
Deepside men (separate contract)	2
Others	
Gearhead attendants	2
Rippers (originally 10)	9
Waste men	4
Packers	12
Shotfirers	2
Water infusion	1
Maintenance	
Fitter	1
Linesman	1
Steel checker	1
Switches and ram pump attendant	1
Hydrox shell man	1
Pipe man (air and water)	1
Total manpower	52

Establishing Production

The face went into full production on October 20, 1958, all packing being established, wastes formed, and the new timbering system in use. The

TABLE 1.—*Extracts from the Weekly Operating Statement for 14s Bullhurst Anbauhobel Plough Face from January to end of July, 1959.*

Week ended	Machine team, o.m.s.	Total face, o.m.s.	Face cost.	District o.m.s.	District cost.
	Cwt.	Cwt.	s. d.	Cwt.	s. d.
Jan. 10 ..	632.6	196.2	8 1.6	122.65	10 11.6
,, 17 ..	668.1	198.4	7 4.4	115.40	11 11.3
,, 24 ..	589.0	198.0	8 7.2	108.60	12 10.3
,, 31 ..	581.0	192.7	8 6.1	119.60	11 4.4
Feb. 7 ..	557.6	180.4	8 10.5	110.90	12 0.3
,, 14 ..	627.9	180.1	9 2.8	112.80	12 2.9
,, 21 ..	594.9	192.3	9 0.3	109.30	12 10.7
,, 28 ..	630.9	210.3	8 0.2	124.90	11 8.3
Mar. 7 ..	579.3	193.1	8 3.9	116.70	11 4.8
,, 14 ..	621.8	195.4	8 8.3	108.10	12 10.6
,, 21 ..	623.5	204.4	8 0.1	122.54	11 6.6
,, 28 ..	640.0	198.8	8 3.3	114.80	12 2.1
April 4 ..	597.1	197.7	8 11.5	110.83	13 5.6
,, 11 ..	619.5	211.7	8 1.9	122.70	11 7.4
,, 18 ..	612.8	204.3	8 2.6	129.2	10 9.7
,, 25 ..	598.0	201.0	8 4.6	129.9	10 11.3
May 2 ..	588.7	202.6	8 4.9	130.3	10 11.1
,, 9 ..	677.0	214.0	8 6.2	144.4	10 7.4
,, 16 ..	613.3	201.1	8 5.6	125.1	11 2.9
,, 23 ..	644.6	203.5	9 10.2	134.5	12 4.2
,, 30 ..	656.4	219.0	8 4.6	138.9	10 9.7
June 6 ..	628.9	203.7	8 3.9	137.3	10 6.8
,, 13 ..	647.6	222.3	8 2.4	137.3	10 10.7
,, 20 ..	670.2	222.5	8 4.0	147.7	10 5.4
,, 27 ..	668.7	219.3	8 2.5	136.5	11 0.0
July 6 ..	704.7	222.9	8 3.9	148.2	10 5.7
,, 11 ..	728.3	241.9	7 5.1	157.0	9 5.5
,, 18 ..	664.4	213.6	8 8.3	140.8	10 11.2
,, 25 ..	642.7	203.4	8 7.4	136.2	10 10.9
Aug. 1 ..	670.7	210.2	8 10.3	136.3	11 3.4

output for the first week was 2,250 tons and the agreed norm was to be 4 ft. advance per day with an additional payment of 3s. 4d. per 3 in. further advance, per man per shift for the power-loading team. This was set to relate to the planned advance of 5 ft. per day for which the men would get 71s. 4d. per shift, this being in line with other forms of power-loading norms and payments. The supports system was based on achieving this 5 ft. daily turnover, although it had a fair amount of flexibility.

From November 20, 1958, to December 27, 1958, a total of 24,529 tons was produced, or 511 tons average output per machine shift. The average advance was 5 ft. 8 in. per machine shift and 1,000 tons was produced during 102 manshifts, giving a productivity for all face personnel of a little over 9.8 tons. Table 1 shows typical results extracted from the weekly operating statement.

Initial Difficulties

During the first few weeks of ploughing, initial difficulties were experienced. These are listed as follow:—

(1) Jamming of the plough due to setting props too close to the panzer conveyor was overcome by setting the props 9 in. away from the conveyor to allow for movement of the conveyor when the plough passed.

(2) It was found that 300 to 350 lb./sq. in. was sufficient to hold the plough to the face; higher pressure jammed the plough by forcing it to bite too deeply into the coal.

(3) Running the plough with the conveyor standing caused overloading and resulted on numerous occasions in blowing the fusible plugs of the fluid couplings.

(4) Lumps were found to fall on to the signal wire, thereby stopping the face conveyor. This was eliminated by fitting spill plates which were 12 in. higher. The original ones fitted were only 6 in. high and were insufficient to prevent coal falling off the conveyor.

(5) Engine attendants failed to keep the plough driving sprockets free of small coal which was drawn up by the plough chain up the guide tubes until the pins in the drive sprockets sheared.

(6) Wrong movements by the switch operator were gradually reduced as experience was obtained.

(7) Overloading of the 30-in. gate belt caused severe spillage and was overcome by installing a 36-in. gate belt.

(8) At the start of the shift the plough was sometimes found to be jammed, breaking the shearing pins. This was found to be due to slight ridging of the floor after standing. The remedy was found to run the plough at least one return trip on every shift.

(9) Jamming of conveyor due to chain stretch was overcome by regular maintenance.

(10) Attendants at each end of the plough run were found to be allowing the plough to over-run the stop blocks near the engines. This caused unnecessary breakage of shear pins until clear stop marks were put on the conveyor structure.

Organization

For an installation of this nature to be successful it is most important that all members of the team are chosen carefully. The men were carefully chosen for their suitability for individual jobs as well as for working as a team, and the officials were chosen for their ability, keenness, and determination to enforce high standard of workmanship.

Stables are prepared towards the end of the shift prior to coal production and only an occasional shot is required on the filling shift if the tops happen to stick.

The coal is infused on the shift prior to coal filling, one man boring the holes 9 ft. apart, and about 7 ft. deep in the middle of the seam so that the coal is infused in advance of the day's ploughing. Between 8 and 10 gal. of water per hole is infused.

The wastes are bored and drawn, chocks moved forward, and then the wastes fired with Hydrox F57 shells, on the first preparation shift. Most of the packing is done on the second preparation shift and are completed on the filling shift. The return rip is advanced on the dayshift and the main gate rippers work on the first preparation shift.

The deepside men load out the 10 yd. deepside, the coal having been prepared late in the previous shift by pulsed-infusion shotfiring. They also move over the deep-side conveyor in readiness for the next filling shift.

The stables are kept at least 3 yd. in advance of the main face, and a double girder is set every 5 ft. with wooden runner bars between the last pair. This means that the distance between each double girder is about 3 ft. 10 in. In the top

stable, one man of the three-man team comes on at the normal filling shift time, the two others come on an hour later. These two men then stay an hour after the filling shift to move the beam or anchor girder forward, securing it in the new position with four heavy-duty screwjack props. This beam is always moved forward the maximum distance (usually 6 ft.), because if the conveyor engine was moved over to the end of the beam while coal filling was in progress, the ploughing operation would have to stop until the beam was moved forward again. This is the reason for keeping the stables at least 3 yd. in advance of the main face.

The two men supervising the passage of the plough also move the rams forward just before they are at the end of their stroke. This has to be done twice, sometimes three times during the filling shift. These rams are spaced every three pans (5 yd.) and each one is attached with a swivel coupling to a bracket on the conveyor.

The timberers are arranged in three teams of two men each and each covers about 50 yd. of the face, and advancing the row of catch props, as required.

Method Study

Approximately eight months after the face went into production, a study of the plough performance on 14s face was made on May 26, 1959, and the main points of the reports are as follow:—

(1) The maximum single shift tonnage produced was 640 tons.

(2) The average tonnage produced per 2-in. slice was 14.3 tons.

(3) Conveyor was stopped 57 times to break lumps at the delivery end.

(4) The plough was reversed 121 times during the shift, this included "planing" hard patches to keep the face in line.

(5) Transport delays amounted to 51 min.

(6) Production potential, if the ploughing could continue, without interruption or cyclic considerations was 1,450 tons per shift.

Conversion from Flight Loading to Ploughing

After the success of the plough installation at the Bullhurst face it was decided to convert 27s Banbury face from flight loading to ploughing.

The conversion equipment consisted of a Westphalia Anbauhobel. It is a fully mechanical coal-getting machine of the rapid plough type, which, in addition to forming part of the complete installation for getting, loading, and conveying as in 14s Bullhurst, it can be attached as additional equipment to panzer conveyors of the Westphalia PF1 or the Hugh Wood P80 type.

It completes the progress in mechanization, from partially mechanized systems with snaking conveyors and prop-free-front faces, to fully mechanized coal getting by ploughing, loading, and conveying, with the advantage of being able to use existing equipment as part of the installation and thereby reducing considerably the total cost of the changeover.

The plough is pulled along the face at 75 ft./min. by a strong chain with a small pre-load and ploughs the solid coal. The coal is then loaded by the plough on to the panzer conveyor and transported to the loading point.

As distinct from early types of plough equipment, the Anbauhobel has separate drives which can be fitted to the drive units of the existing panzer without much structural modification. These drives, with reversible motors which both transmit their driving power to the plough chain, through fluid couplings, are operated from the same switchboard as the conveyor and by the same operator.

The plough body has a length of 6 ft. 6 in., a width of 3 ft. 8 in. (with bottom guide plates), a minimum height of 12 in. (adjustable, giving a depth of slice 2 in. to 6 in. at a speed of 75 ft./min. Driving power is provided by two 45-h.p. motors giving a maximum pulling force of 20 tons. Thickness of plough chain links is $\frac{7}{8}$ in. and average breaking load of the chain is 50 tons.

The changeover was scheduled to start on the afternoon shift of April 24, 1959, and to be in running order for April 27, 1959. Banbury 27s face is situated $1\frac{1}{2}$ miles from the No. 4 pit bottom and working at a depth of 3,700 ft. from the surface. The Cockshead Seam has been extracted several years previously from 50 yd. below the Banbury Seam workings. The face is 165 yd. long working along the strike, with a dip at the face of 1 in 4.

The section of the seam is as follows:—

Hard grey bind laminated roof.
Coal (bright), 3 ft. 8 in. } working section.
Dirt band, 1 in. }
Coal, 1 ft. 1 in. }
Dirty binds, 9 in.
Dirty inferior coal, 2 ft.
Fireclay floor.

The face was being worked successfully by cutting with a Duplex jib, fitted to a 70-h.p. AB coal cutter, the same machine, being mounted on a P80 armoured conveyor, flight loading the coal after preparation.

The floor made by the cutting jib was maintained just on top of the 9-in. dirt band to form a good floor. The coal worked, averaged 4 ft. 10 in. thick, which included the persistant 1-in. dirt band.

The face was supported by Dowty Monarch props and 7-ft. Bathgate bars. Roof conditions generally were good, although the coal tended occasionally to stick to the roof.

The reasons why it was decided to plough this face were as follow:—

(1) The success of the Bullhurst installation.

(2) The degradation of the Banbury coal due to the shotfiring necessary to prepart it for flight loading, followed by further degradation by flight-loading operations.

(3) To reduce shotfiring as far as possible.

(4) To produce the coal on one shift instead of having a full haulage staff on the preparation shift.

(5) To save face manpower.

(6) Improve roof control.

FIG. 4.—THE ADJUSTABLE ANBAUHOBEL WITH SWIVELLING PRE-CUTTING BLADES AT WORK ON NO. 27 BANBURY FACE.

Existing equipment before the changeover consisted of a P80 Hugh Wood conveyor 150 yd. long; an AB 15 70-h.p. coal cutter with Duplex undersling jib, equipped for flight loading an effective cut of 4 ft. 6 in.; a 10-yd. Cowlishaw Walker deepside conveyor; an AB compressed-air-driven coal cutter for the deepside and main stable; a 30-h.p. Cowlishaw Walker stage loader; a 30-in. Hugh Wood belt conveyor loading in the Banbury dip shunt; waste and coal drilling and infusion equipment; Dowty Monarch props throughout; Bathgate 7-ft. 6-in. bars; and two Walton chocks, for every 5-yd. waste.

Conversion Equipment

Equipment to be installed in order to convert flight-loading operations to ploughing off the solid is listed as follows:—

(1) Existing P80 conveyor drives to be changed for similar ones fitted with adaptor plates to take plough drives.

(2) Westphalia motors and plough gearboxes and conversion frames to be fitted to the conveyor and plough drives.

(3) New type spill plates with hinged cable covers to be fitted.

(4) Gullick ramming equipment to be fitted.

(5) Davies signalling equipment to be fitted to conveyor.

(6) Guide tubes and two special lead-off tubes to be fitted.

(7) Plough chain to be fitted (40 8-yd. lengths) with couplings.

(8) Special plough (swivelling pre-cutters) to be fitted.

(9) All electrical equipment, gate-end boxes switchboard, etc., also Gullick pump and motor, to be installed 10 yd. from face ripping on main gate.

(10) Telephones spaced along face conveyor, with phone at switchboard, two signal bells, one in middle and one at top end of face near top drive.

(11) The headside AB cutter to be stripped of Duplex jib and fitted with a standard 5-ft. jib for use in deepside section.

(12) Suspension beam, stell prop shoes, beam carriage and attachments, also engine sliding beam for bottom engine, and both shifting devices, to be fitted. Six heavy-duty screwjack steel props, four for use and two for spares, for securing the suspension beams.

(13) Seven hundred GHH metre link bars to replace the 7-ft. Bathgate bars; also, 100 additional Monarch props. One hundred and forty GHH shoes for the above. Four 15-ft. twin girders with roller brackets, two to set over each engine and additional 12-ft. girders as required, all "starred" for prong-top Dowtys.

(14) Complete grappling pulley blocks for tensioning plough or conveyor chain.

Different Type of Plough

Due to leaving 2 ft. of bottom coal and 9 in. of slaty dirt, it was decided to use a different type of plough to that of the fixed-blade type used in 14s Bullhurst. There had recently been made available by Westphalia Company, Limited, an adjustable type of plough (Fig. 4), having swivelling pre-cutter blades.

The use of three pre-cutting bits in advance of the bottom bit, led to the possibility of using these pre-cutters as an aid to steering the plough in the vertical plane. To achieve this, the pre-cutters are mounted separately from the main plough body and can be swivelled in a vertical plane, by simply turning an adjusting and locking nut.

Thus, if the plough is leaving bottom coal, or tending to climb, it can be drawn into either stable and the pre-cutting blades either raised or lowered to remedy the fault. The range of the swivelling device is such, that the tips of the pre-cutters can be set to 50 mm. below, or 100 mm. above the top of the bottom fixed blade, or in any intermediate position.

This development, which had been previously tried out in Germany, was said to be a decided improvement, and was the type of plough to be used at the Banbury face.

Changeover

The changeover from flight loading to ploughing was so planned that it was accomplished without any loss of output. As new equipment was delivered, it was built up on the surface, and a complete inventory made. Also, having two

spare engines, it was decided to run the equipment on the surface on trial.

When the time approached for changing over, this equipment was dismantled and loaded direct into tubs and trollies and stored ready, in the order in which each part had to be sent underground.

During the two weeks prior to the weekend when the changeover was scheduled, all the equipment was sent into the district.

The electrical switches and cables were sent down, installed, and tested, followed by the special spill plates made by Cowlishaw, Walker & Company, Limited, which were fitted with hinged cable covers, all of a heavy-duty construction. Then followed the Gullick ramming equipment which was installed to the conveyor, and was actually in use a week before the changeover.

The adaptor plates for the plough drive were next fitted followed by the motor and gearboxes forming the drives for the plough chain. Face telephones, bells, and signalling equipment were fitted, also the trailing cables were placed in the cable troughs on the spill plates.

The plough chain and guide tubes were stored at the return rip and the plough itself was brought on to the face behind the conveyor near the bottom end.

Flight loading was finished and the face was drawn off on the Friday dayshift, April 24, 1959, and on the afternoon and night shifts the plough chain and guide tubes were installed. Also the coal cutter was taken off the panzer and put into the deepside which was to continue to be hand loaded.

The plough itself was got over the conveyor and put into position on the face side with its guide plates under the conveyor. The suspension beam was also installed with its carriage and anchor props.

During the following Saturday morning and afternoon shifts, all the necessary couplings were made and 100 extra Dowty props and all the new GHH link bars and shoes were brought onto the face.

On Sunday dayshift, the plough was run up and down the face and the first row of link bars and Dowty props were set to start the new system of support.

After the face had settled down to the new system, sizing tests were taken on May 14, 1959. Thirty four tubs were picked at random from the run-of-mine coal and the following results were obtained:—Over 3-in., 27.9 per cent.; over 1½-in., 17.3 per cent.; under 1½-in., 54.8 per cent. These results show a product comparable in size with conventional hand-filling with a reduction in shotfiring of at least 800 shots per week.

Acknowledgments

Acknowledgment is made to all officials and workmen concerned at Sneyd Colliery for their co-operation and enthusiasm in helping in these installations. The help of Mr. Russell, surveyor, in making the necessary plans and drawings, and also Dollery & Palmer, Limited, and Westphalia Lunen Company for their assistance with photographs and information is recognized. Any opinions expressed are those of the author and not necessarily those of the National Coal Board.

DETECTING FAULTS IN METHANE DRAINAGE INSTALLATIONS

INCREASED rates of face advance can result in a disproportionate increase in the percentage of methane in the ventilating current in mines. To overcome this difficulty and also generally to improve working conditions, methane drainage techniques are being applied at a number of collieries. A fracture of a pipe or other leakage of air into the methane drainage pipe range can have two serious consequences. It may reduce the methane content of the drained gas below an acceptable level if the gas is being sold to the Gas Board, and it can bring the gas mixture below the upper limit of explosibility.

This may mean that the drainage has to be stopped in part; if not, the whole of the colliery and, in turn, production, may have to be halted because the firedamp level is raised above the statutory limit.

It is extremely important that a leak be located and repaired as quickly as possible. This normally involves a long and tedious examination of the whole of the pipe range.

The National Coal Board's Research Establishment at Isleworth (Middx) has designed and installed at Haig Colliery in the Northern (N&C) Division an instrument monitoring scheme in which methane measuring heads employing an acoustic technique are used to monitor the main drainage pipes at points up to five miles from the shaft bottom. Also, signals indicating the gas concentration are transmitted to the surface and displayed on a chart recorder in the control room. Alarms are operated if present limits are exceeded to draw attention to the fact that a potentially dangerous situation may be arising.

This system, which is intrinsically safe, has operated satisfactorily for over 20 months and proved to be of immense value, the initial cost of the installation being recouped several times. An extension of the principle has been designed to control automatically the concentration of methane being drained from behind the sealed-off waste area at Avon Colliery, South-Western Division, where the gas is being sold to the local Gas Board. This is necessary because the concentration rises and falls inversely in accordance with the movement of the barometer, and at present control can only be achieved by manual means.

Forthcoming Events

JANUARY 23

Institution of Electrical Engineers (Mersey and North Wales Centre):—Joint meeting with the Institution of Mechanical Engineers (North-Western Branch) and Liverpool Engineering Society at the Royal Institution, Colquitt Street, Liverpool, at 6.30 p.m. "Cybernetics," by Prof. J. C. West.

Institution of Electrical Engineers (Western Utilization Group):—Meeting at the South Wales Institute of Engineers, Park Place, Cardiff, at 6 p.m. "The Utilization of Electricity in Steelworks," by T. B. Rolls.

JANUARY 24

Institution of Chemical Engineers (North Western Branch):—Meeting at Birkenhead Technical College at 7.30 p.m. "Experimentation and Reactor Design in Process Research and Development," by W. Waddington and W. D. Betts.

Institution of Plant Engineers (South Wales Branch):—Meeting at the South Wales Institute of Engineers, Park Place, Cardiff, at 7.30 p.m. "Industrial Flooring," by E. Davison.

Combustion Engineering Association (North Western Region):—Meeting at the Engineers' Club, Albert Square, Manchester, at 2.30 p.m. "Heating and Ventilation Problems," by J. B. Atherton.

Institute of Marine Engineers (North East Coast Section):—Meeting at Stephenson Building, King's College, Claremont Road, Newcastle-upon-Tyne, at 6.15 p.m. "The Future Doxford Marine Oil Engine," by P. Jackson.

Institution of Chemical Engineers:—Meeting at the Geological Society, Burlington House, Piccadilly, London, W.1, at 5.30 p.m. "A Survey of Chemical Engineering Education and Practice," by Prof. R. E. Johnstone.

Institution of Electrical Engineers (Measurement and Control Section):—Meeting at Savoy Place, London, W.C.2, at 5.30 p.m. Discussion on "Machine-tool Control," opened by Dr. E. H. Frost-Smith.

Institution of Mechanical Engineers (South Wales Branch):—Meeting at the South Wales Institute of Engineers, Park Place, Cardiff, at 6 p.m. "Sealing Characteristics of Stuffing-box Seals for Rotating Shafts," by Dr. D. F. Denny and Dr. D. E. Turnbull.

JANUARY 25

Society of Instrument Technology (South Wales Section):—Meeting at the Welsh College of Advanced Technology, Cardiff, at 6.45 p.m. "The Fire and Explosion Hazard of Intrinsically Safe Instrumentation," by S. J. Emerson.

Institution of Production Engineers:—Meeting in the Lecture Theatre, Royal Aeronautical Society, 4, Hamilton Place, London, W.1, at 6.30 p.m. 1961 Lord Sempill Paper: "The World's Future Transport Requirements," by Sir Percy Hunting.

Combustion Engineering Association (Midland Region):—Meeting at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham 2, at 10.30 a.m. "Efficient Use of Gas in Industry," by A. C. Jennings.

Institution of Production Engineers (Shrewsbury Section):—Meeting at the New Technical College, Shrewsbury, at 7.30 p.m. "Latest Developments in Palletization," by J. P. Harvey.

Institution of Production Engineers (Worcester Section):—Meeting at the Star Hotel, Worcester, at 7.30 p.m. "Gear Cutting," by J. R. Hookins.

Institution of Production Engineers (Brighton Group):—Meeting at the Old Ship Hotel, Castle Square, Brighton, at 7 p.m. "An Introduction to the Flow Turning Process," by E. J. Bennett.

Institution of Mechanical Engineers (Southern Branch):—Meeting at the Technical College, Reading, at 7.30 p.m. Discussion on "Organizing and Designing for Safety in the Engineering Industry," opened by H. van der Vord.

JANUARY 26

Society of Chemical Industry (Corrosion Group):—Meeting at 14, Belgrave Square, London, S.W.1, at 6.30 p.m. Conversazione.

Institution of Plant Engineers (Merseyside and North Wales Branch):—Meeting at the Exchange Hotel, Liverpool, at 7.15 p.m. "Steam," by J. S. Brundrit.

Institution of Plant Engineers (Sheffield and District Branch):—Meeting at the Grand Hotel, Sheffield, at 7.30 p.m. "Roller Bearings for Some Heavy Engineering Applications," by A. Pollock.

Institution of Mechanical Engineers (East Midlands Branch):—Meeting at the Lecture Theatre, College of Further Education, Loughborough, at 7.30 p.m. "The Potentialities of Accurate Measurement and Control in Engineering," by Prof. J. Loxham.

Institution of Mechanical Engineers (North Western Branch):—Meeting in the Literary and Philosophical Society Rooms, George Street, Manchester, at 6.45 p.m. "Pressure Vessels for Gas-cooled Graphite Moderated Reactors," by M. J. Noone and R. F. Bishop.

JANUARY 27

Institution of Mining Engineers:—Annual general meeting at the Royal Institution of Naval Architects, 10, Upper Belgrave Street, London, S.W.1, at 11.15 a.m.

North East Coast Institution of Engineers and Shipbuilders:—Meeting at the Mining Institute, Newcastle-upon-Tyne, at 6.15 p.m. "Fatigue Strength of Marine Shafting," by G. P. Smedley and B. K. Ratten.

Institution of Plant Engineers (Birmingham Branch):—Meeting at the Imperial Hotel, Temple Street, Birmingham, at 7.30 p.m. "Power Factor Correction of Electrical Plant," by G. Hoyland.

JANUARY 30

Institution of Plant Engineers (West and East Yorkshire Branch):—Meeting in the Houldsworth School of Applied Science, Leeds University, at 7.30 p.m. "The Uses of Molybdenum Disulphide," by G. J. Vineall.

National Association of Colliery Managers

JANUARY 25

Lancashire Branch:—Meeting in the Lecture Room, Manchester Literary and Philosophical Society, George Street, Manchester. "Record Speed Tunnelling in the Burnley Area," by M. Daniecki, Area tunnelling engineer.

JANUARY 26

South Staffordshire, Warwickshire, Worcestershire, and Shropshire Branch:—"Management Structure," by Mr. De Ville.

JANUARY 27

Kent Branch:—Meeting at the Swan Hotel, Deal, at 7.15 p.m. "Planning a Trolley Locomotive Scheme at Chislet Colliery," by T. E. Green, chief traction engineer, NCB, and L. Neal, planning engineer, South-Eastern Divisional Coal Board.

CONFERENCE ON X-RAY ANALYTICAL METHODS

A CONFERENCE on X-ray analytical methods will be held at Manchester University in conjunction with the Department of Geology, from March 20 to 24. The conference will discuss and evaluate the latest techniques and instrumentation of X-ray fluorescence analysis. An extensive range of modern equipment will be available for demonstrating the principles of these methods over a wide field of applications.

Full details may be obtained from the conference secretary at Research & Control Instruments, Limited, 207, King's Cross Road, London, W.C.1.

NEGOTIATIONS FOR THE annual supply of 10,000,000 tons of iron ore to the Ruhr steelworks are reported to have taken place between West German representatives and the President of the Liberian Republic, together with the chairman of LAMCO. It is believed in Monrovia, however, where the discussions were held, that the figure of 10,000,000 tons is exaggerated and that substantial deliveries could not be effected before 1963 in any case.

Metallurgical Progress

Some abstracts from recent reports on research and developments, at home and abroad

High-energy-rate Forming Processes — Their Present and Future. D. PECKNER. (Materials in Design Engineering, 1960, Vol. 51, No. 7, pp. 89-96.) High-energy rate forming is being explored for forging, welding, sheet-metal forming, and powder metallurgy. The principal advantages are:—(1) Parts can be formed which could not be formed by conventional methods; (2) excellent for re-strike operations; (3) springback after forming is reduced to a minimum; (4) excellent dimensional tolerances; (5) variations from part to part are held to a minimum; (6) scrap is low; (7) less equipment and fewer dies are used. Parts are shaped by the extremely rapid application of pressures as high as 2,000,000 lb./sq. in., and speeds of 3,000 ft./sec. may be used. Methods developed include the use of energy from detonated high explosives, expanding-gas systems, high-pressure gas forming, and hydrospark forming. Three different explosive-forming techniques are used:—(*a*) Free forming; (*b*) bulkhead forming, and (*c*) cylinder forming.

Because the amplitude and shape of the pressure pulse behind the shock front can be controlled closely, Du Pont has stated that the latter type is preferable. In the expanding-gas methods, gases generated by the burning of propellant powders in a closed container produce the pressures required to form metals. In each die, which is completely closed, the gases expand directly against the workpiece. In the high-pressure, gas-forming process, a " Dynapack " machine is used, where a piston is made to move with almost explosive velocity. In the hydrospark method, a spark is discharged in a non-conducting liquid medium and generates a shock wave which travels at the speed of sound from the spark source to the workpiece.

Electron-beam Methods Move into Production. ANON. (Steel, 1960, Vol. 147, No. 11, pp. 124-7.) Electron-beam metalworking is being used in the purification of metals, in welding, and in machining. These methods rely on two primary advantages:—(1) Freedom from contamination, and (2) precision of control. The electron-beam source and the work are mounted in vacuum chambers in which pressures reach 10^{-4} to 10^{-5} mm. of mercury. The heated metals do not pick up stray contamination —in fact, they are likely to lose impurities in the process. The power of the electron beam can be controlled closely and the diameter in the impact area can be focused precisely (<0.001). The beam can be pulsed to produce short intervals of instantaneous high power. Larger vacuum chambers are being used. One chamber, for high-voltage welding parts of nuclear-fuel elements, will be 25 ft. long, with an inside diameter of 44 in. At one plant, three electron-beam furnaces are casting refractory metal ingots up to 6 in. dia.

It is predicted that electron-beam welding will be used more than other electron-beam processes. Welds have been made in ¼-in. thick metal at 10 in./min. and 0.10 in. deep welds at 30 in./min. Shrinkage and thermal distortion are minimal. The elimination of special spacers, reduced machining, and the absence of straightening have cut direct-labour costs on welding by about 40 per cent. Two distinct types of electron-beam welding equipment are available—relative low-voltage types (to 50 kV) and high-voltage units (to 150 kV). Tungsten, most of the stainless steels, titanium, and molybdenum are some of the metals which have been welded by this method. Four production applications of electron-beam machining are reported. The process can use a beam that is focused to 0.0008 in., and it can drill, under optimum conditions, a hole only 0.0004 in. dia. A limitation to the process is that the deepest hole that can be machined is about 0.08 in.

Residual Elements in Steelmaking. F. C. LANGENBERG and J. F. JOHNSON. (Metal Progress, 1960, Vol. 78, No. 3, pp. 69-76.) Small amounts of many elements—copper, tin, arsenic, and lead, etc.—remain in steel when refining is completed. These " minor " elements can have a decided effect on the physical and mechanical properties of the metal. Many of the effects on the properties of iron and steel depend on the type of occurrence in the metal product. The authors deal with a number of elements giving the sources and their effects in steelmaking. The copper content of steel melts can be lowered by two methods. If the initial copper content of an Fe-Cu-C melt is fairly high and the carbon content >0.03 per cent., there is a separation into two liquid phases, one phase rich in iron and the other rich in copper. The solubility of copper in the iron-rich phase decreases with decreasing temperature, and separation using this immiscibility should be performed at the lowest practical temperature. Also, copper can be removed by treating melts with lead or sodium-sulphide slags. There is no practical method for removing tin from the bath, so tin should be kept out of the scrap. It would appear that the content of several of the residuals could be lowered by vacuum melting. Time under vacuum has a great effect on the residual content of iron-base binary alloys. In work done in a vacuum-fusion gas-analysis apparatus (where the pressure was 1 micron and temperature 1,600 deg. C.), manganese, lead, copper, tin, and zinc boiled from the melt quite rapidly. Conversely, chromium and silicon dropped slightly, while nickel and phosphorus were virtually unaffected.

Metalworking with Explosives. J. PEARSON. (Journal of Metals, 1960, Vol. 12, No. 9, pp. 673-

81.) Explosive forming is a dynamic new method of metalworking. Many operations, such as forming, sizing, cutting, compacting, and welding, can be performed by the energy released from detonating or deflagrating an explosive. Explosive working has attracted interest for the following reasons:—(1) The need for performing press operations on large parts where the required force is greatly in excess of present press capacity. (2) The need for new techniques in working some "space-age" metals. (3) The possible savings in terms of equipment and labour for the production of certain types of short-run items. Emphasis is placed on reproducing types of operations, especially those used in the forming of large sections of high-strength, hard-to-form materials, and in the production of low-volume, unusual-shaped items, which have been outstanding. Explosive working offers new and unique operations of its own. The future promise for this field appears to lie in the extension of explosive working to operations now beyond the reach of conventional equipment, rather than in duplicating the results of conventional methods. If these are not doing the job satisfactorily, then explosive working should be considered; in many cases it will offer a satisfactory solution.

Folding Metal to Produce Corrugated Designs. ANON. (Iron Age, 1960, Vol. 186, No. 9, pp. 59-61.) A cam-controlled action in the machine moves the forming dies in both horizontal and vertical planes. The process permits simultaneous offsetting, perforating, slotting, or lancing. Numerous variations in materials, gauges, and dimensions may be obtained as corrugations of varying depths can be made without changing either cams or dies. The vertical action of the machine allows for corrugation depths to be adjusted. The spacing of the corrugation is controlled by the horizontal action of the machine or thickness of the dies. It is possible to vary the horizontal stroke to achieve adjacent corrugations of one spacing while alternate corrugations will be of another. This machine will form most of the structural metals, including steel. In spite of the intricacy of the corrugated pattern, folded metal can be further formed. Subsequent operations can include stretching, shearing, embossing, or bending. Corrugated materials can be made at the rate of from 2 to 9 ft./min., depending on the spacing of the fins. Folded metal is available in gauges ranging from 0.002 to 0.030 in., the tolerance being $\pm$ 0.001.

A Giant Furnace to Meet the Demands for Vacuum-melted Steels. ANON. (Iron Age, 1960, Vol. 186, No. 9, pp. 62-3.) Planned to go into production in the near future is a large consumable-electrode furnace which will be able to turn out steel ingots of 5-ft. dia. The projected annual capacity is 8,000 tons. The overall height will be 40 ft. from the floor, the furnace being mounted on a base plate of 13 ft. by 13 ft. The water jacket and crucible assembly will be in a pit 31 ft. deep by 27 ft. long. The first ingots to be produced will be 40 in. dia. and 14 ft. long, weighing 25 tons. To improve the quality of air-melted steels, a vacuum-stream degassing system has been installed. This removes gases such as hydrogen, oxygen, and nitrogen. To permit degassing of smaller ingots it has been decided to have ladle-to-ladle degassing, the ingots being poured after the metal has been degassed. These new consumable-electrode, vacuum-melting furnaces produce steels with good physical properties. A high degree of cleanliness is achieved through the removal of non-metallic inclusions and excess gases. Better chemical and mechanical properties result due to freedom from segregation. The steels show improved workability and ingot soundness.

Developments Extend the Market for Stainless Powders. W. L. BATTEN. (Iron Age, 1960, Vol. 186, No. 9, pp. 64-6.) Stainless-steel powders are becoming more and more useful. Until recently it has been difficult to process these powders into useful shapes, most problems occurring in sintering. Good practice dictates sintering conditions which are more reducing than the combination of a -20 deg. F. dew point and a 1,090 deg. C. heat. The sintering time varies with compact density and sintering conditions. Among the furnace designs which are best suited to the sintering of stainless steel are the pusher and hump types. In the pusher furnace, the work is manually or mechanically pushed on trays through the heating zone. The furnace consists of a closed muffler inside a heating chamber. The muffler is attached to a vestibule and cooling zone. This furnace may be gas-fired or electrically heated, and it operates at heats up to 1,260 deg. C. The atmosphere enters the muffler at the junction of the heating and cooling zones. Production can reach 900 lb./hr. With the hump-melt furnace, heating can be by gas or electricity. Some furnaces have a closed metal muffler, while others have a dense refractory chamber with heating elements inside. Adding a lubricant to these powders improves the mechanical properties for structural use.

Revealing Lead Inclusions in Leaded Steels. GLADYS M. CHALFANT. (Metal Progress, 1960, Vol. 78, No. 3, pp. 77-9.) This metallographic procedure permits direct microscopic observation and identification of lead inclusions in leaded carbon, alloy, and resulphurized steels. Three definite steps must be followed to maintain the lead inclusions in place. A longitudinal section of the billet is obtained for examination. During all cutting operations, the specimens should be flooded with a coolant, after which they are ground on a wet-belt grinder. Intermediate grinding is done on a horizontal wheel covered with a silicon-carbide disc, the wheel being rotated 550 revs./min. and flooded with water during grinding. The specimen is rubbed on a 3/0-grit emery paper embedded with graphite. After grinding, specimens are polished on a wheel covered with a billiard cloth, soaked in an aqueous suspension of gamma alumina. The total time for polishing should not exceed 3 min. If the surface has been rough-polished correctly, the lead appears as black-mottled areas. Final polishing is done on a non-rotating wheel covered with a

"Microcloth" which is saturated with a weak solution of gamma alumina, which has a pH of exactly 7. After cleaning the surface it is sprayed with 180-proof ethyl alcohol and dried in a hot-air blast. After the final polish, lead inclusions are off-white areas with black boundaries. These are distinct and could not be confused with any other phases present in leaded steels.

Surface Films on Annealed Stainless Steels. J. H. WAXWEILER. (Metal Progress, 1960, Vol. 78, No. 3, pp. 80-3.) When bright annealing of stainless steel is done in hydrogen with a dew point of −25 deg. F. or higher, the resulting strip has a definite blue appearance. This investigation was carried out to see how the colour characteristics of the surface varied as the dew point was changed in small increments. A laboratory furnace was equipped with a muffle and a coiler to accommodate foil 0.0015 in. thick. After heating to 1,065 deg. C., the muffle was supplied with a hydrogen atmosphere. The dew point was varied by mixing hydrogen from two sources: bottle hydrogen with a dew point of −30 deg. F., and dried hydrogen with a dew point $<$ −85 deg. F. Several feet of strip were annealed at various dew points between these limits. When two strips were compared, separated by only a few feet, it was difficult to determine which was the brighter.

As a more sensitive method was needed, a spectrophotometer was employed. Colour was measured by trichromatic coefficients and reflectivity by tristimulus values. Results indicated that the specimens bright annealed in the laboratory developed surface films with the same colour characteristics as production strip. To find the constituents present in the films, electron-diffraction studies of the surface were carried out. The constituents were identified as aluminium and chromium oxides in different combinations. A surface film of aluminium and chromium oxides was present at the lowest dew point that could be achieved. As the dew point was increased, the amount of chromium oxide relative to the amount of aluminium oxide increased until the latter constituent could no longer be identified in the suface film (dew point −30 deg. F.).

Silicon Irons Up To Date. W. MORRILL. (Metal Progress, 1960, Vol. 78, No. 3, pp. 84-7.) Advances have been made in the crystal-oriented silicon irons. Grain-oriented, anisotropic silicon iron is a crystal-textured material, having a cube edge direction of the basic iron lattice lying parallel to the long, or rolling, direction of the strip, and a cube-face-diagonal plane in the plane of the strip. This is developed by secondary crystal growth, controlled through selective actions of impurities at critical annealing temperatures, as well as by the basic matrix texture. Since favourable magnetic characteristics are essential, these impurities must be removed from the silicon iron after they have accomplished their grain-growth function. This is done during the latter stages of heat treatment, through solid diffusion and surface-reaction control. Also, better knowledge of mechanisms (crystal growth and chemical purification) has aided improvement of commercial annealing cycles.

Advancements made in the past years would have been impossible without improved instrumentation and analytical techniques. Equipment has been devised for measuring both static and dynamic magneto-striction. One instrument evaluates dynamic magneto-striction on wide and long laminations as they are used in a transformer core. A similar wide-lamination tester for core losses has been of value in a more satisfactory use of silicon iron in transformer cores. A rapid determination of traces of carbon is possible with commercial equipment equivalent in precision to the low-pressure combustion method.

Heat Treating Large Steel Castings. T. DITCHFIELD and R. G. WAITE. (Metal Progress, 1960, Vol. 78, No. 3, pp. 93-6.) Direct-fired, radiant gas burners maintain a uniform temperature in the furnace which allows close control of the operation. This is important for large, irregularly shaped castings which are difficult to heat treat. The furnaces, designed for normalizing and tempering large castings, have a firing arrangement which not only provides fast, uniform heating to 930 deg. C., but can provide also a uniform soaking heat at any tempering temperature. Heat is supplied by 36 "Duradiant" burners set in the sidewalls. Three additional burners in the sidewalls, just inside the door, counteract heat losses. Hearth effects are overcome by a row of flame-type screen burners. Each radiant burner consists of a kiln-fired, ceramic-lined cup. Burning of a gas-air mixture against this cup-shaped refractory surface makes the surface incandescent, and radiant heat is beamed directly on the casting, but, as combustion is confined to the cup, there is no flame impingement on the work. A completely combustible mixture of gas and air is supplied to the burners—no secondary air is required. The heat input is regulated by motorized valves in the air-supply line. Flame-type burners are used with a fired-refractory flame screen, resulting in a larger total-heat output.

Gas Reactions Play Key Role in Iron-pellet Reduction. J. HUEBLER. (Iron Age, 1960, Vol. 186, No. 12, pp. 104-6.) Carbon monoxide and hydrogen serve as the active reducing gases in direct-reduction and magnetic-roasting processes. Where reduction takes place with carbon monoxide at 930 deg. C. the ore is reduced to gamma iron, which becomes carburized to form austenite. If the ratio of carbon dioxide to carbon monoxide is low, the carburization of gamma iron continues until the limit of solubility is reached. At this point, free cementite forms. Reduction with carbon monoxide at lower temperatures is more complex. In the range 705 to 760 deg. C., carburization of alpha iron results in the formation of ferrite. Further carburization forms a mixture of ferrite and austenite, and, as carburization proceeds, more austenite forms. Further carburization produces more carbon in solution in the austenite, and, when the solubility is reached, free cementite forms. The

cementite forms as a physical mixture with saturated austenite.

A partially reduced hematite pellet or grain is composed of several layers, with a layer of magnetite surrounding the core. The magnetite is covered by layers of wustite and completely reduced iron. If the reducing gas contains carbon monoxide or methane, the iron layer will contain carbon. The outer layer may be a complex mixture of ferrite and austenite. Porosity allows for free access of the gas from the outside of the grain to the wustite-iron inter-face. Porosity is a vital factor. As completion of the reaction approaches, the presence of impurities has an influence on the reaction rate. The impurities tend to prevent contact between the gas and the iron oxide. The rate of reduction is directly proportional to the partial pressures of the reducing agents which are present.

Orders for Parsons Turbo-Blowers and Generators

CONTRACTS received during the past year, states C. A. Parsons & Company, Limited, Heaton Works, Newcastle-upon-Tyne, reviewing some of the work in hand, include turbo-generators, turbo-blowers, and also the turbines and other equipment for the latest nuclear power station in this country. One of these contracts is for three turbo-blowers complete with condensing plant and auxiliaries, and two 10-MW single cylinder "pass-off" turbo-generators also complete with condensers and auxiliaries, for the new Spencer Works of Richard Thomas & Baldwins, Limited. The new works forms part of a large development scheme by RTB, and the blowers will be the largest units of the kind in Europe and the first modern axial-flow blowers to be constructed by a British manufacturer. Each will deliver 170,000 cu. ft. of free air per min., at 45 lb./sq. in. pressure.

The turbines for these blowers develop an output of 23,000 b.h.p. and will operate with steam conditions of 625 lb./sq. in. pressure at 830 deg. F. temperature. Each is of the single cylinder pure-reaction type. The turbines for the two 10-MW turbo-generators are of the single-cylinder type designed for similar steam conditions as the turbines for the blowers, but arranged for passing out steam from a single pressure point at 170 lb./sq. in.

Other turbo-generators have been ordered for power stations in this country and for export to Canada, Eire, and Nigeria. A large number of turbo-generators, with a total output of 1,726,800 kW, were commissioned during the year.

PRODUCTION of bituminous coal and lignite in the US during December, according to the Bureau of Mines, US Department of the Interior, was 31,885,000 net tons, compared with 37,720,000 net tons in the previous month and 40,554,000 net tons in December, 1959.

PORT KEMBLA'S NEW SINTER PLANT

THE No. 2 sintering machine at Port Kembla was started up in April, 1960, and is one of the largest of its kind in the world and dwarfs the No. 1 machine alongside it. The increased sintering capacity at Port Kembla will play a vital role in Australia's development by making greater use of the resources of soft ores, thereby conserving the hard ore deposits at Iron Monarch. It is expected that the new machine will provide a 100 per cent. prepared burden of screened ore and sinter to all Port Kembla furnaces, resulting in increased iron production. The machine incorporates some distinctly new engineering features in its design, but mix preparation, sintering, and cooling operations are metallurgically similar to the No. 1 machine. Both installations are of Lurgi Chemie design. The new No. 2 sinter machine is 4 m. in width and 176 sq. m. suction area.

Production of lime-bearing sinter commenced in September, 1958. Limestone additions to the mix were gradually increased up to a maximum of 18 per cent. of the raw feed. Finally, satisfactory operation and sinter quality were attained with a limestone addition of 8 per cent. Sinter is currently being produced on both machines with this limestone percentage addition. Experience at Port Kembla has shown that sintering operations with limestone additions are more stable, although significant increases in sinter production rates have not been achieved.

At the latest Port Kembla plant, considerable importance was attached to dust control and approximately £350,000 was spent on two Lurgi electrostatic precipitators to serve materials handling and a deduster unit to clean the waste gases. Although the dimensions of the new machine at Port Kembla are impressive, it will be dwarfed by the new strand to be installed in another sinter plant at Newcastle on a site fronting the Hunter river, on the north-west edge of the steelworks. This huge new plant is at present in course of erection.

Tubemakers of Australia

Tubemakers of Australia, Limited, has announced that its subsidiary, Stanton Pipes of Australia Pty., Limited, registered in Melbourne with a capital of £5,000,000, would build a large new plant in the Sydney area. The plant is designed to manufacture annually 80,000 tons of spun cast-iron pipes in a range of 4 in. to 20 in., and will cost over £2,000,000. A similar plant will be built later in the Melbourne area. Three other subsidiary companies of Tubemakers of Australia are also currently building new plants. Automatic Tube Company Pty., Limited, has almost completed one at Granville (NSW) for the manufacture of electrical conduit tube, British Tube Mills (Australia) Pty., Limited, is engaged on a new factory for the manufacture of precision tube at Sunshine (Victoria), while Mephan Ferguson Pty., Limited, is building a new plant for the manufacture of large steel mains at Kwinana (Western Australia).

Installation of a FRICTION WINDER

South African Gold-mining Practice

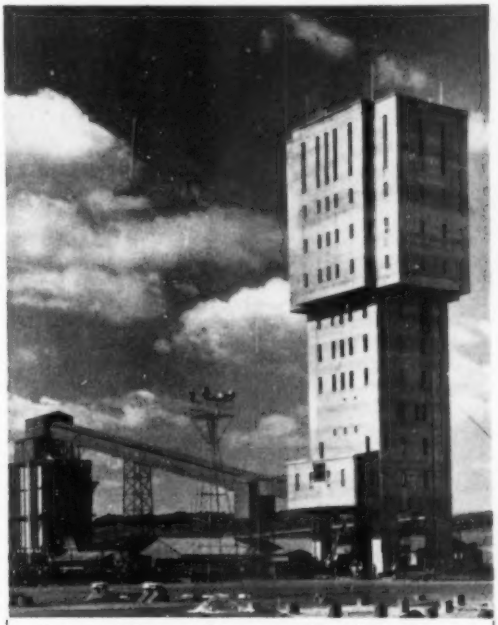

FIG. 1.—WINDING TOWER OF NO. 5 SHAFT OF THE WEST DRIEFONTEIN GOLD MINING COMPANY, LIMITED.

Claimed to be one of the largest friction hoists in the world, the winding engine serving the No. 5 shaft of the West Driefontein Gold Mining Company, Limited, South Africa, is the subject of an article in the autumn issue, 1960, of the GEC Journal. The authors, C. Meyer and C. B. Read, describe the installation and operation of the winder which started to hoist ore in 1959. Extracts from the article are appended.

DEVELOPMENT of the West Driefontein Gold Mining Company, Limited, began in 1945 with the sinking of No. 1 and No. 2 shafts. Shortly afterwards No. 3 and No. 4 shafts were started to open up the mine for normal working. Subsequently, the existence of the Carbon Leader, a carbonaceous reef, was proved at the western end of the property, where a gold-bearing reef, known as the Ventersdorp Contact Reef, was also found to occur. No. 5 shaft was therefore planned to enable these reefs to be worked.

The mine went into production in 1952 and the No. 5 shaft started hoisting ore in 1959. The monthly tonnage sent to the treatment plant (130,000 tons) is almost double the initial output of the mine. The Main Reef, from which millions of pounds worth of gold has been extracted in the Central Witwatersrand, has also been located in the area of the No. 5 shaft. It seems likely, therefore, that the ultimate total production from the mine will be considerably in excess of the 200,000 tons per month envisaged at present.

No. 5 shaft is circular in shape with a diameter of 25 ft. and is divided into six compartments accommodating the conveyances of three separate winders. The underground development of the area served by the shaft has been planned for the ultimate production of 180,000 tons per month, the ore being brought to a central loading station located at a depth of 5,460 ft. below ground level.

It was decided that these conditions called for the provision of a single high-capacity multi-rope friction winder for hoisting the ore. Accordingly, an order was placed with the General Electric Company, Limited, London, W.C.2, for a four-rope winding engine of this type, powered by two d.c. motors of 2,050 h.p. each. The ore is raised at a speed of 3,000 ft./min. in two balanced bottom-discharge skips with a capacity of 15 tons each. The maximum capacity of the winder is 370 short ton/hr. and provision for automatic operation has been included.

The other two winders, which were not supplied by GEC, comprise a twin-rope service friction hoist handling a three-deck cage and a counterweight, and a conventional double-drum winder (for men and materials) sited at ground level remote from the head-frame structure. The two friction hoists

and the sheaves for the double-drum winder are mounted in a concrete tower with an overall height of 213 ft. 6 in., built over the shaft. The exterior is illustrated in Fig. 1 and the internal arrangement is shown in Fig. 2.

Mechanical Equipment

It was realized that problems might be encountered with winding depths of 5,500 ft., particularly with regard to equalization of the tensions in the four winding ropes. For this reason the drum of the West Driefontein winder was designed as an extremely rigid, fabricated, mild-steel structure secured by fitted bolts and welding to two cast-steel bosses keyed on the drumshaft. The drum was manufactured in halves for ease of transport and to facilitate raising it into the tower structure. The two halves, each with net weight of 30 tons, were secured on erection by fitted bolts and shrink rings round the central bosses.

The diameter of the drum at the rope centres is 17 ft. 6 in. and the four 1¾-in. dia. ropes are spaced at 24 in. pitch. One brake path, 20 ft. dia., is incorporated on each end of the drum. The rope tread material, of dovetail section, is held in position by wedge-shaped timber baulks securely bolted to the drumshell. The rim of the drum is also arranged to accommodate division plates, which allow two ropes to be coiled on the drumshells simultaneously and thereby permit rope installation or changing to be carried out without the need for a special winch.

The main drumshaft is manufactured from forged steel and is in two sections, the principal section supporting the drum and a smaller stub shaft supporting the main gearwheel. The two sections are connected by a solid flanged marine-type coupling and are carried in three self-aligning whitemetal-lined bearings arranged for lubrication by twin oil rings and/or a separate flood system.

As the tower structure is of reinforced concrete it was considered that no elaborate method of alignment between drum and gearshafts was necessary. The outer drum bearing was, however, arranged on a soleplate incorporating an adjustable wedge which allows the bearing centre height to be varied, thus providing a means of distributing the shaft loading proportionately between the three bearings.

The single-reduction double-helical gears, which transmit the drive to the drum from the two motors, comprise a fabricated solid-type wheel pressed on to the stub shaft and secured by double tangential keys, and twin forged-alloy-steel pinions integral with their shafts. The gears are lubricated by spray nozzles fed from a separate self-contained oil system. The motor and pinion shafts are connected by Wellman Bibby type couplings.

The mechanical brakes consist of two pairs of straight posts supported on cast-steel anchor brackets firmly secured to the tower structure. To each post is bolted a curved brake shoe lined at a machined face with woven asbestos friction material. The two pairs of posts are operated, through rods and levers, by one of two brake engines.

A hydraulic pressure brake engine is used to apply the brakes under normal manual and emergency conditions, and also when the winder is operating automatically. In the event of failure of the hydraulic system a standard weight engine

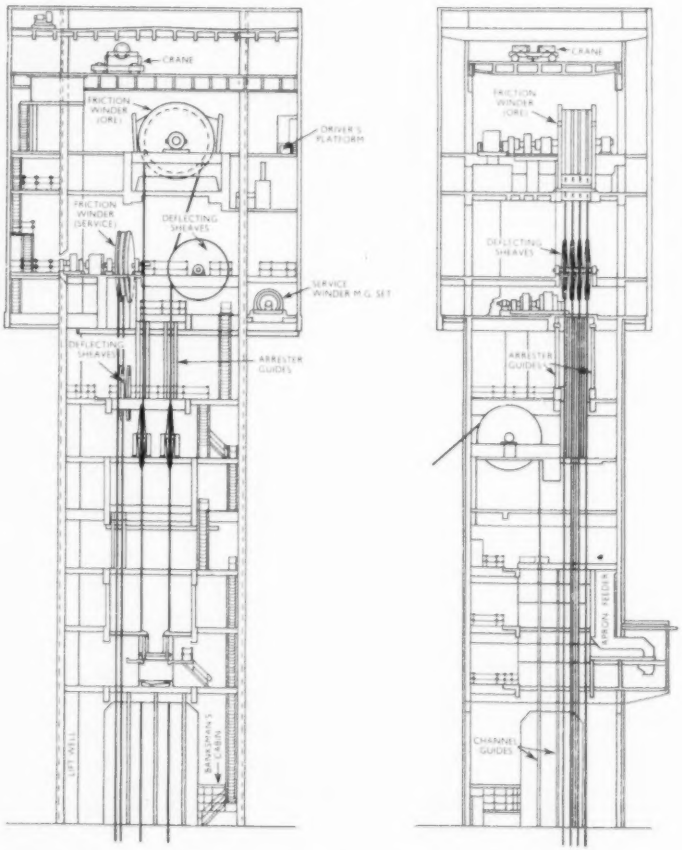

FIG. 2.—INTERNAL ARRANGEMENT OF THE WINDERS IN THE TOWER OF NO. 5 SHAFT.

applies the brakes. Both engines are connected to a common floating lever which applies the brakes, and the mechanics of this lever are such that the maximum braking force exerted is limited to that force exerted by the most powerful engine. In no circumstances can the braking force of the two engines be transmitted to the shoes. This is of particular importance on a friction winder as such a force could cause slip of the ropes over the drum due to the excessive retardation.

The pressure brake engine consists of a two-diameter cylinder fitted with a two-diameter piston and the operating pressure is 130 lb./sq. in.

The auxiliary equipment supplied with the winder includes a twin-vertical-screw depth indicator, with magnifying dials for the final two revolutions of the drum, and a Black speed controller for detecting overspeed or overwind conditions. This equipment, together with the geared potentiometer which controls electrically the speed of the winder relative to its position in the shaft, is driven from the winder drumshaft through rope-creep compensating devices. These devices correct automatically the relative positions of the skips and drum, as the ropes are not, of course, rigidly anchored to the drum, and tend to creep over it when in service.

Deflecting sheaves, 15 ft. dia. and of fabricated construction, are provided to adjust the centres of the four winding ropes to suit the centres of the skips in the shaft. The four sheaves were designed and manufactured in halves for ease of installation. They are mounted on a common shaft, one outer sheave being keyed and the remainder free to rotate individually to accommodate any relative variations in travel between ropes during winding. The ends of the shaft are carried in roller bearings and grease lubrication both for the bearings and the bushed rotating sheaves is incorporated. The sheave rims are recessed to receive split rope-tread inserts of dovetail cross-section.

The variable voltage supply for controlling the speeds of the motors is derived from a motor generator set operating on the Ward Leonard principle. The set comprises two 1,600-kW generators and a 3,800-h.p., 735-r.p.m. induction motor mounted on a common bedplate. The motor is started by a liquid starter and is fitted with rotor short-circuiting gear.

The motor generator set is housed at ground level some distance from the base of the winder tower, and the route length of interconnections between the winder motors and generators is approximately 500 ft. To reduce cable costs to a minimum, a system of connecting motors and generators in series in the sequence generator-generator-motor-motor was adopted in place of the more usual generator-motor-generator-motor sequence. This permitted two runs of four single-core 1 sq. in. cables instead of four.

Rope-creep Compensation

To compensate for rope-creep on the friction drum, the auxiliary drives to the depth indicator and geared potentiometer and to the Black's hoist controller are adjusted at the end of each alternate wind by the use of a special gearbox. This is similar in layout to a motor-car differential gearbox, where the two half-axles can be considered as forming the input and output shafts respectively and the crown and pinion wheels are represented by a worm wheel and worm.

The output shaft normally runs at the same speed as, but in the opposite direction to, the input shaft. If the worm wheel is rotated a certain amount by a geared motor, however, the output shaft is moved relative to the input shaft, thus giving the necessary relative adjustment between the friction wheel and the depth indicator, etc., even while the winder is in operation.

The geared motor is arranged to run for a fixed time at the end of each wind and the direction of rotation is governed by two switches. One of these is operated by a cam in the auxiliary drive and the other by the skip in the shaft; the direction of rotation is fixed by the first switch to open. Thus, the position of the skip in the shaft as indicated by the depth indicator, etc., is always maintained within a certain margin either side of the true skip position. By using this system it is not necessary for the winder to remain stationary while compensation is taking place, thus avoiding interference with the winding cycle.

Erection and Commissioning

Erection of the hoist followed conventional procedure, except that it was carried out some 200 ft. above ground level. To ensure perfectly true running of all rotating parts it was considered desirable that the brake paths and rope treads should be machined with the hoist in position.

For trueing the brake paths a special slide rest and rig were manufactured. The slide rest was hand-operated and traversed a carbide-tipped lathe tool across the width of each brake path. Light cuts were taken until a continuous true surface was obtained. The drum was rotated by the main motors during this operation and credit is due to the form of electrical control provided in that the drum speed had to be maintained steady for long periods at speeds of less than about 3 r.p.m., *i.e.*, about 5 per cent. of full speed. The rope treads were trued by means of a portable motor-driven grinding rig fitted with a coarse-grit wheel profiled to the true shape of the tread. The grinder was run at a relatively slow speed to avoid burning the rubber.

The rope treads for the deflecting sheaves were also trued by means of the same grinding rig, but for this duty the hoisting ropes were in position, and the sheaves were driven by them while the hoist was run at slow speed.

As had been expected when the hoist was designed, operating depths of over 4,000 ft. brought to light problems not previously encountered. To give a satisfactory wear factor non-spin ropes, instead of the conventional Langs lay rope, were installed in the shaft and rubber inserts fitted to the friction drum.

The balance ropes were the first to be let down

the shaft. The two ropes were wound from the reel on which they were supplied by the rope manufacturer, one on to each drum of a winch previously used during sinking operations. The free ends of the two ropes were fastened next to a suitable cross-head and lowered into the shaft. Once in their approximate working positions the ropes were clamped at the bank and shaft stations and disconnected from the winch.

Two winding ropes of opposite lay were next wound on to the winch. Pilot ropes were used to lead them up to the tower and over the deflecting sheaves and main winder drum. The main winder and the winch were next rotated in unison until the main rope ends were at the bank position. Here they were clamped to the No. 1 skip. The skip was then lowered to the shaft bottom, the winder and the winch still being rotated to maintain the same rope speed.

One of the balance ropes, already in the shaft, was attached to the No. 1 skip at the shaft bottom and the other end of the same rope to the No. 2 skip, still on the surface. The remaining two winding ropes were coiled on the winch drums and led up over the deflecting sheaves and main winder drum and clamped to No. 1 skip. This skip was then lowered to the shaft bottom while the winch and the main winder once more maintained the same rope speed.

All main winding ropes and the other balance rope were connected to their separate conveyances and the system was ready for operation. For changing the winding ropes a similar procedure will be adopted, the ropes being handled simultaneously.

PNEUMOCONIOSIS STATISTICS

STATISTICS obtained from the Ministry of Pensions and National Insurance and the National Coal Board are collated in Pneumoconiosis in the Mining and Quarrying Industries, Digest of Statistics, 1959, published by the Stationery Office (3s. 6d.).

Pneumoconiosis is the result of many years of exposure to dust in the mining and quarrying industries, and most cases are in the older age groups. Cases now being diagnosed are the product of dust conditions of many years ago, before the present arrangements for dust suppression were in operation. Increases in numbers of new certifications are mainly attributable to increasing awareness of the disease as a result of which workmen are very sensibly showing a greater readiness to be X-rayed. Mass miniature radiography and other X-ray surveys at the collieries chosen for research on pneumoconiosis have undoubtedly contributed to this awareness. Rises in certification figures in any area therefore do not necessarily indicate that the true prevalence of the disease is increasing.

Material Handling Conference

The second international conference organized by the Institute of Materials Handling will be held at Southport (Lancs) from May 10 to 12. Visits to works and installations in the Lancashire and Cheshire industrial centres will be included in the programme. Details of the conference may be obtained from the institute at 32, Watling Street, London, E.C.4.

National Coal Board Specifications

SPECIFICATIONS recently issued by the National Coal Board include those mentioned below. The charge for each specification is 6d. unless otherwise stated. They may be obtained on application to the NCB.

No. 209 (price 1s.) relates to flameproof air-break circuit breakers of 200-A rating for use on three-phase, 5 cycles, a.c. circuits up to 650 V.

No. 210 (price 1s.) covers the standard flameproof air-break circuit breaker of 300-A rating for use on three-phase, 50 cycles, a.c. circuits up to 650 V. A circuit breaker to this standard, when used as an incoming unit to a bank of panels, should only be connected to the bank of panels by means of a cable from the normal outgoing cable arrangement on the circuit breaker.

No. 211 covers a range of single-reduction worm gear units with 4-in., 6-in., and 8-in. shaft centre distances, having specified minimum horsepower rating, motor speeds, and gear ratios.

No. 212 (price 9d.) refers to welded steel wire mesh panels for the lagging of underground roadways in conjunction with steel arch supports.

No. 213 (price 9d.) refers to steel wire helical binders for coupling together welded steel wire mesh lagging panels for underground roadways.

No. 215 (price 9d.) covers normally single-sized aggregate for use in the construction and maintenance of roads, and gives requirements for grading and particle shape and methods of sampling and test.

No. 216 (price 9d.) lays down requirements for the grading and particle shape of nominally single-sized gravel aggregates for use in the construction and maintenance of roads. The sizes specified cover the range $1\frac{1}{2}$ in. to $\frac{1}{4}$ in. They include material intended for surface dressing, for coated macadam, and for asphalt mixture. All the sizes may be used for the manufacture of coated macadam and asphalt; the sizes normally used for surface dressing with gravel are $\frac{1}{2}$ in., $\frac{3}{8}$ in., and $\frac{1}{4}$ in.

No. 217 covers precast concrete units for kerbs, channels, edgings, and quadrants in a range of sections, lengths, and radii, for use in the construction of carriageways and footways.

No. 219 lays down requirements for manhole covers and frames and for road gully gratings, covers and frames, intended for use in drainage works.

A SPANISH REPORT states that Nueva Montana Quijano is constructing a new continuous wire rod mill of 35 tons hourly capacity. Fabrica de Mieres has been authorized to set up a reversible 2-high billet mill of 180,000 tons per annum capacity in its Ablana (Oviedo) plant. Altos Hornos' new blooming/slabbing mill is now fully operational and the billet mill transferred from Baracaldo to the Sestao building, which is now almost completed.

The Regenerative Gas Furnace of Siemens

by M. Schofield, M.A., B.Sc., F.R.I.C.

WHEN, on January 22, 1861, Karl Wilhelm Siemens (who became Sir William Siemens) patented his gas-producer for use in his regenerative furnace, he laid a foundation in modern steel production. Siemens was one of four brother technologists, all versatile as inventors or in devising new equipment, with Werner Siemens particularly eminent in the electrical field.

William Siemens first came to benefit Britain in 1844 when he sought to introduce a steam-engine governor and one or two other inventions to British industrialists. Being struck by the high losses of energy in gases escaping to the atmosphere, he began to plan his regenerative principle, at first for the case of steam from steam engines.

An Unsuccessful Effort

This first effort proved unsuccessful, for, despite the fact that a Manchester firm paid Siemens a fee for the engine patent, it was abandoned in 1859. Yet the inventor was not put off experimenting with a view to applying his regenerative principle to furnaces as the milestone in ferrous metallurgy which came in 1861 was to show.

In his first patents for regenerative furnaces using solid fuels Siemens specified that outgoing combustion gases should be made to impinge upon and impart their heat to " an extended surface of brickwork " or other refractory substance interposed between the place of combustion and the exit stack. Currents of cold air or gases en route to the combustion zone could then, by use of a valve, be made to impinge first upon the less and then upon the more intensely heated surfaces, thus recovering the heat deposited by the outgoing gases and thereafter going to the combustion chamber pre-heated.

Siemens illustrated his furnace of this type with diagrams, and described his " regenerator " as built in " what is called open Flemish bond " and consisting of open walls of brickwork, the bricks in one wall being opposite to openings in the next. By means of the valve in the chimney the direction of currents could then be reversed and cold air or gas would now pass through the open brickwork regenerator attached to fireplace number two.

From this preliminary work on his regenerative principle Siemens now came to his gas-producer, patented on January 22 and described in a paper before the Institution of Mechanical Engineers on January 30, 1861. He told how an essential of his new furnace was for solid fuel to be treated in a separate apparatus or producer so that advantages from the absence of any solid carbon or ashes in the working chamber of the furnace would result, this apart from the advantage of pre-heating gaseous fuels in his open brickwork regenerator.

He told how in previous attempts to apply his principle to puddling and other larger furnaces serious practical difficulties arose until, with the adoption of gaseous fuels, the results surpassed all expectations. He claimed that fuels could be of inferior types since the low calorific value of the resulting gas is compensated for by pre-heating in a regenerator and also by heating the air used for combustion. Siemens visualized the use of such low-grade fuels as peat, sawdust, coal slack, and lignite, and described how water placed below the bars of producer grates would further augment the effect by forming hydrogen. He also mentioned the advantages accruing from cleansing gaseous fuels for use in chemical works and in metallurgical industries.

It was at the flint glass works of Lloyd and Summerfeld in Birmingham that the first gas regenerative furnace of Siemens appeared in Britain, this after a preliminary trial of the technique at the Siemens & Halske firm in Berlin. The glass industry in general was far readier to adopt Siemens' principle than any metallurgical industry, although even here there was much scepticism. One works manager saw a gas regenerative furnace at work and waited all night to see a fraud exposed; for he could hardly believe such high temperatures could result from such small quantities of fuel he saw being used.

After a Mexborough glassworks adopted the gas furnace it was the turn of a much larger concern, namely, the glass firm of Chance Bros. at Smethwick. After the first trial no fewer than 13 furnaces were changed to the gas regenerative type, together with a special furnace for producing glass for lighthouse lenses.

Faraday's Enthusiasm

In March, 1862, Michael Faraday saw the success of Siemens at Smethwick and wrote from the Royal Institution to Siemens to ask for drawings with which to illustrate a lecture on a Friday evening at the Royal Institution. After Siemens had sent full details of the construction and

applications of his invention, Faraday went to Birmingham with the inventor himself to follow up the details on a practical scale, this resulting in the Faraday Lecture on the subject given in June, 1862.

At the International Exhibition of that year the gas regenerative furnace was shown and was awarded a medal, an award which accelerated the recognition of advantages of the invention to such an extent that more than 100 furnaces were built in Britain and on the Continent during the next year or so. It was appreciated how the reduced temperatures of effluent gases not only saved heat energy but banished the roar of flames from the stacks.

From a furnace operating with flames at 2,260 deg. C. it was found possible to keep flue gases down to 150 deg. C., this fall being demonstrated at Crewe by placing some wood in the chimney flue of a works during operation, furnace hands being fined for wasting fuel if the wood became burned or too strongly charred.

While glass manufacture got off to a flying start in adopting the Siemens gas furnace, the iron and steel industry soon followed with its wide adoption after 1861, while chemical industries and the heating of gas retorts also soon used the regenerative principle.

Although Siemens seems to have had puddling in mind when he first worked on his invention, with the Bolton firm of Rushton & Eckersley enabling him to work on a practical scale, he specified the melting of steel among applications of his furnace.

With Réaumur's idea of melting wrought iron and cast iron together on an open hearth of a reverberatory furnace still not forgotten by Sheffield steelmakers, the Siemens gas furnace was certain to become applied to the open-hearth steel furnace, especially after 1863 when Siemens granted a licence to the Martin brothers in France.

A year previous to this Siemens had achieved success first in the simple melting of steel in bulk without use of crucibles, work at Sheffield being supplemented by such experiments as at Durham, where Charles Attwood made a trial with 5 cwt. of steel.

French Experiments

In France, with the metallurgist Le Chatelier becoming interested, the brothers Pierre and Emile Martin, of Sireuil, saw the possibilities of a trial in which the roof of a furnace had melted with the intense heat from application of the gas furnace idea.

The Martin brothers tried out the idea of Réaumur, melted steel with a gas regenerative furnace, and hence took out a licence from Siemens.

Siemens himself assisted the brothers in incorporating his gas regeneration scheme in their open-hearth furnace; hence the "Siemens Martin" furnace of modern steel production resulting from an award for "Siemens Martin" steel at a Paris exhibition. With the Legion of Honour awarded to Siemens, the jealousies of French interests seeking to refer only to the "Martin open-hearth furnace" came to an end.

At the 1867 Paris International Exhibition a major award went to the "Siemens Four à Gaz à Chaleur Regénerée." Back in Britain there was still some scepticism and further experimenting. Three years after the trials at the Tow Law Works in Durham we hear of further studies at Barrow and elsewhere, with Birmingham now coming into the picture in that ferrous phase of her metallurgical history which has been forgotten.

Thus, Siemens himself began further work at Hampton Street in the Midland city, while in 1866 he reported much success in a steelmelting furnace there which dealt with "extra soft steel for wire making," the furnace lining being still intact after five weeks' operation. "I can produce a ton of cast steel for less money than Bessemer, and of superior quality," was his claim.

Hence, it was in Birmingham and not in Sheffield that Siemens took a lease of some premises for 14 years and got manufacturers to commission him to produce steel for them. In 1867 came a further venture with the founding of the Landore Siemens Steel Company in Swansea. From then on the Siemens regeneration furnace was established as an economic and highly productive means of making good quality steel.

Human Implications of Work Study

OBSERVATION of the effects of work study on human relationships and day-to-day organization is reported in a case study published by the Department of Scientific and Industrial Research. It deals with the impact of work study at all levels in an industrial organization and describes what happened during, and after, the introduction of work study by consultants into a medium-sized Midlands firm. It is a study of change and people's reaction to it.

The application of work study was not wholly successful, but subsequent analysis of the difficulties encountered revealed that their real cause was neither obvious nor technical—they were due to different expectations and basic assumptions of the various groups concerned. For example, the same words and phrases held quite different meanings for different people. Analysis showed that the changes which were introduced involved a closer control of people's activities and they felt under constraint and pressure. Management and the consultants did not anticipate this closer control nor did they recognize it when it happened.

While making it clear that it is impossible to draw up a series of "do's" and "don'ts" for the introduction of work study, the report contains a number of useful recommendations. It should be valuable both to industry and for teaching purposes in management courses. Copies are available from the Human Sciences Unit, DSIR Warren Spring Laboratory, Gunnels Wood Road, Stevenage (Herts), free on request.

New Literature

BOOKLETS, catalogues, house magazines, and other publications received recently include those mentioned below. Readers wishing to obtain a copy of any of the items referred to should apply direct to the address given, at the same time mentioning IRON AND COAL.

ROCOL, LIMITED, Swillington, near Leeds—The company's latest advisory publication deals with the applications of Rocol products in the many types of equipment in conventional power stations.

BRITISH TIMKEN, Duston (Northants)—The December issue of Timken has just arrived from the other side of the Atlantic, and if its pages dealing with Christmas celebrations in many parts of the world may be a little out-dated, they can still be read with interest.

INCANDESCENT HEAT COMPANY, LIMITED—Cornwall Road, Smethwick, Birmingham—"A Complete Service in Industrial Heat Engineering" is the title of a new bulletin (No. V.10C). Attractively produced, the publication will be found of considerable help to all interested in the subject.

BRADLEY & FOSTER, LIMITED, Darlaston (Staffs)—Bradley's Magazine may be small in size, but there is always interesting material to be found in it. Mr. R. Haynes's lecture to the Sheffield Trades Technical Society on "Hot-formed Coil Springs" is among the contents of the winter number.

STENNOR, LIMITED, Kew Foot Road, Richmond (Surrey)—The industrial division of the company (a member of the Firth Cleveland group) has prepared an illustrated handbook on the use of its Weldbelt equipment for the repair and splicing of rubber and p.v.c. conveyor belts, transmission belts, cables, airlines, and rubber hose, tarpaulins, and canvas sheeting.

INSTITUTION OF WORKS MANAGERS, 196, Shaftesbury Avenue, London, W.C.2—Disturbing trends in industrial accidents are commented upon by Ronald W. Clark in the January issue of Works Management, which also contains an interesting article on "Providing Future Leaders" by J. F. M. Holland, and other contributions designed to appeal to those charged with industrial organization responsibilities.

ALCAN INDUSTRIES, LIMITED, Bush House, Aldwych, London, W.C.2—The gold-coloured aluminium eagle on top of the United States Embassy in Grosvenor Square, London, has attracted considerable attention since it was hoisted into position by crane a few months ago. The bird, which is 18 ft. high with a 35-ft. wingspread, is the subject of a feature in the November issue of Aluminium News, which has just reached us from Canada.

SUFFOLK IRON FOUNDRY (1920), LIMITED, Stowmarket (Suffolk)—Chart No. 2 in the new series of Sifbronze welding data and instruction charts is now available. This quick reference chart (price 2s.) gives conversion factors and tables, temperature scales, flame temperatures, gas values, melting points, and welding data for Sifbronze welding on mild steel and mild-steel fusion welding. It also illustrates common defects in welding and forms of welding joints.

HENRY WIGGIN & COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—An article describing the 4-ft. wind tunnel recently opened at the Wharton works of English Electric Aviation, Limited, is featured in the latest issue (No. 59) of Wiggin Nickel Alloys. Large plates of Monel nickel-copper alloy, ¾-in. thick, are used for the flexible walls of this supersonic wind tunnel. The issue contains several other interesting features, all attractively presented.

EDGAR ALLEN & COMPANY, LIMITED, Imperial Steel Works, Sheffield 9—The January issue of the Edgar Allen News is the first under its new editor, Mr. Alan B. Jordan, who has succeeded Mr. Eric N. Simons, who held the appointment for 41 years. Wisely, perhaps, he has not attempted at once to introduce any "new look" to a magazine that is read with great interest by technical people at home and oversea. We wish Mr. Jordan every success in his endeavours.

FEDERATION OF BRITISH INDUSTRIES, 21, Tothill Street, London, S.W.1—How management can help and guide the editor of works magazines is outlined by Stanley Townsend in an article in the January issue of the FBI Review (2s. 6d.). The article should prove helpful to all engaged in and responsbile for the production of industrial literature. There are many other features in the issue which will be well worth the attention of those engaged in industry at various levels.

C. A. PARSONS & COMPANY, LIMITED, Heaton Works, Newcastle-upon-Tyne—The fact that the Christmas number of Parsons Journal did not reach us until the New Year celebrations were but a pleasant memory did nothing to diminish our enjoyment of the issue. Among the technical articles, Dr. J. M. Robertson's "Metallurgy in Large Turbo-generator Design," is well worthy of attention, while, on the lighter side, we can all enjoy Carola Oman's "David Garrick" and John Lowe's "Cakes and Ale" (a history of eating and drinking in England from 1200 to 1800) before returning to read further technical matter.

BRITISH ALUMINIUM COMPANY, LIMITED, Norfolk House, St. James's Square, London, S.W.1—Decorative super purity aluminium is the subject of a new and attractive catalogue. Super purity is very high purity aluminium refined by a special process to a minimum of 99.99 per cent. purity. Suitable brightening treatment confers a brilliance and lustre comparable with and, in many instances, superior to, alternative reflecting surfaces. Anodizing preserves this brightness and, as the anodic film on super purity is transparent, a thick protective film can be applied without impairing the brightness, particularly the specular component which determines image clarity.

HIGH SPEED STEEL ALLOYS, LIMITED, Widnes (Lancs)—The December issue of Alloy Metals Review is very largely devoted to an article on "Ferritic Alloy Steels for Power Plant" by M. G. Gemmill, B.Sc., A.I.M., of the Central Electricity Generating Board. The author surveys the role of ferritic alloy steels in power plant in terms of historical development, service experience, philosophy of selection, and design stresses. He implies that benefit can be derived from service failure to strengthen the various assessment techniques for material selection and suggests this might take the form of creep and corrosion studies, greater emphasis on mechanisms rather than test methods, and, for weldability, exploration of the metallurgical and mechanical aspects of plastic-deformation.

TIN RESEARCH INSTITUTE, Fraser Road, Greenford (Middx)—Anti-friction bearings containing 6 per cent. of tin, remainder aluminium, are now being made

in France from rod which has been continuously cast. The advantages of this method of casting are that the structure of the tin-aluminium alloy has excellent anti-friction qualities, combined with high strength, and the material can be used for solid bearings without a steel backing. Although tinplate containers are used in their thousands of millions, this is only possible thanks to the most careful methods of control of the material, both in its manufacture and usage. Some of the intricacies of the study of these problems are described in "Resistance of Tinplate to Rust and Corrosion," an article by S. C. Britton, M.A., F.R.I.C., F.I.M., and K. Bright, B.Sc., in the latest issue (No. 50) of the institute's quarterly journal, Tin and its Uses.

BRITISH IRON AND STEEL FEDERATION, Steel House, Tothill Street, London, S.W.1—The history of stainless steel from its invention in 1913, when the idea of a steel which would remain bright was considered "contrary to nature," to the present day when it is an ever more useful material for a large variety of industries, is traced by Lionel Davidson in the January issue of Steel Review (3s. 6d.). The free interchange of technical literature benefits both East and West, and R. Sewell, information officer at the research and development department of the United Steel Companies, Limited, discusses the problems involved in making the results of Russian and Chinese technological work accessible to the West. He describes the translation facilities available to the steel industry. Seventh in the "Company History" series deals with the Yorkshire family business of Arthur Lee & Sons, Limited, Sheffield. The story is told by Earl B. Thomas.

KEITH BLACKMAN, LIMITED, Mill Mead Road, London, N.17—Four catalogues, each complete in itself with specification, drive arrangements, capacity tables, dimension drawings, etc., dealing with the complete range of "Tornado" standard blowers and exhausters, are now available. They are:—Publication No. 53, Type "N" cast-iron blowers and exhausters, direct or indirect driven, with a volume range of 30 to 275 c.f.m. at pressures from 6 to 14.5 in. w.g.s.p.; publication No. 7, Type "MP" cast-iron blowers and exhausters, direct or indirect driven, with a volume range of 20 to 3,000 c.f.m. at pressures from 1 to 9 in w.g.s.p.; publication No. 54, 20-in. types 7, 8, and 9 cast-iron blowers and exhausters, direct or indirect driven, with a volume range (according to whether one, two, or three stages) of 100 to 1,250 c.f.m. at pressures from 9 to 52 in. w.g.s.p.; publication No. 47, backward-bladed types 8, 9, 13, and 14 steel-plate blowers and exhausters, direct or indirect driven, with a volume range of 200 to 10,000 c.f.m. at pressures from 4 to 30 in. w.g.s.p. Dealing with another of the growing range of industrial dust collection equipment is publication No. 55 on the "Tornado" hydro precipitator dust collector.

Information Service of the European Communities

ORIGINALLY set up early in 1956, the London office of the information service of the European Communities at 23, Chesham Street, S.W.1, is now ready for greater activity. The office is the official source in the UK for news and general information on the activities of the European Economic Community (Common Market), the European Atomic Energy Community (Euratom), and the European Coal and Steel Community (ECSC). Staff has been increased to meet the greatly increased demands on the office, especially from British industry requiring information about the Common Market.

Head of the office is Dr. Roy Pryce, who joined the staff of the Information Service of the High Authority of the European Coal and Steel Community in March, 1957, and who was in charge of its information office in London until its recent conversion into an office of the joint information service for all three European Communities. At the end of last year an assistant to the head of the office was appointed. He is Mr. Russell Lewis, formerly on the staff of the British Iron and Steel Federation. The service is under the control of a council of administration, consisting of one member of each of the Community executives.

Like similar offices in Paris, Bonn, Rome, The Hague, and Washington, the London office receives and distributes news and background information direct from the spokesman's groups attached to each of the Community executives in Brussels and Luxembourg.

Sampling of Imported Iron Ores

FIRST of a new series of British Standards dealing with the sampling of ores has been published. It is "British Standard for the Sampling of Imported Iron Ores, Part 1: Hammer and Shovel Method" (BS 3278: 1960: Part 1). The new standard is designed to meet the growing need for a standardized form of preparation of iron-ore samples at UK ports. The differing conditions at ports, as well as the varied nature of imported ores, limit the detail which can usefully be incorporated in a standard, but the basic principles which apply in all cases are covered.

Part 1 has been prepared recognizing that ships of larger tonnage than hitherto will come increasingly into use, necessitating more rapid methods of sampling by mechanical means. This part applies to sampling of imported iron ores from ships' holds at the port of arrival immediately after arrival.

Recommendations are made for the method of selection of sub-samples and the number of increments, the method of sampling, the gross sample and reduction of the certificated sample, and the final samples.

A plan of sampling and sampling reduction is included, in addition to an appendix giving an example of the general procedure recommended.

Copies of the standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1 (price 3s.; postage will be charged extra to non-subscribers).

CARDOWAN COLLIERY EXPLOSION

Deputy Chief Inspector's Report

The explosion which occurred at Cardowan Colliery (Lanarkshire) on July 25, 1960, is considered to have been caused by an ignition of firedamp, the igniting source being provided by the oxidation of carbonaceous material left after a previous fire in January of last year. Subsequent investigation of the explosion area was not possible because of the need to seal it off again.

FOUR men lost their lives as the result of an explosion at Cardowan Colliery (Lanarkshire) on July 25, 1960. The explosion occurred during operations which followed the removal of stoppings constructed to seal off an underground fire which broke out on January 29, 1960. Subsequent investigation of the area was not possible because of the need to seal it off again, states Mr. H. R. Houston, HM Deputy Chief Inspector of Mines and Quarries, in his report on the explosion published on Wednesday (Cmnd. 1260, HMSO, 5s.).

However, the Deputy Chief Inspector considers that when the air was readmitted to the face, originally effected coal or partially coked coal left after the fire in January was reheated by oxidation, burst into flame and ignited firedamp which had not been cleared. The report recalls that the colliery has a history of relatively heavy emission of firedamp and that there have been previous explosions.

The fire which occurred in January at a coal face was started by the ignition of firedamp while the coal was being undercut, and was spread by burning gas to the coal and wooden props. Attempts to extinguish the fire were abandoned when several small explosions in the waste made it clear that to continue would expose the firefighters to the risk of a serious explosion. The only possible course of action left was to smother the fire by building seals about 1,400 yd. outbye of the face in the two roads giving access to the district.

Breaching the Stoppings

After about five months it was considered safe to attempt to reopen the district during the pit's annual holiday in the latter part of July. Samples of air from the sealed-off area showed that the atmosphere had rapidly become so deprived of oxygen that it could not support a fire. It was known that a very large volume of firedamp had accumulated behind the seals and that the safe removal of this would require great care.

Because of the strength and amount of masonry and cement used in the seals, and in the interests of safety, it was necessary to breach them by charges of explosive fired electrically from the surface while no one was below ground and while the inclined roadways behind the seals were full of water which had been pumped through the stoppings. The charges were successfully fired on July 16, and the resulting holes through the seals were large enough to enable the ventilation to be restored and to permit persons to re-enter the district.

Continuous Efforts

Between the time when the seals were breached and the explosion on July 25, efforts were in progress to remove the firedamp which had collected in the previously sealed-off area by passing fresh air through it, and to explore and make safe the workings inside the seals. The mobile laboratory of the Scottish Divisional Coal Board was on the spot for the analysis of air samples which were taken continuously in an effort to detect any recrudescence of the original fire.

A large number of air samples was taken and analyzed without delay. The results did not cause alarm at the time; although the percentages of carbon monoxide and the oxygen deficiencies were too small to enable reliable and informative ratios to be calculated, the concentrations of carbon monoxide were often definitely above normal level. The method of collecting the air samples ensured a representative sample of the general body of the air in the roadway at the sampling points, but the Deputy Chief Inspector considers that it left something to be desired in the circumstances. The presence of the carbon monoxide should have prompted a review of the situation of the sampling points and of the method of collecting the individual samples.

It is well known that half-burned coal or half-coked coal are very liable to reheat spontaneously when exposed to fresh air, especially if the temperature is slightly above the normal. The rate of reheating is slow at first, but accelerates very rapidly in its later stages, especially as the point of open

conflagration is reached. In the present case, fresh air reached the district very soon after the seals were breached, and some of it traversed both sides of the face for several days. During this time there was ample opportunity for reheating to start and develop.

On the day of the explosion a party of 11 comprising one of HM Inspectors, a group manager of the NCB, officials of the mine, rescue workers, mechanics, and workmen, were in the mine. Three of them were killed, one received injuries from which he died later, and six others were injured.

The deputy and two mechanics who lost their lives in the explosion were sent to work in the return while large accumulations of firedamp still existed on roadways on the inbye side of them. While they were in the return, work was in progress to clear a fall of roof at the face, which might well have sent gas on to them.

Rescue men, with breathing apparatus, were used to provide support for persons working underground and, at least at the time of the explosion, they accompanied them closely. The Deputy Chief Inspector considers that it would have been better practice for the rescue men to have remained not too far away, but under cover in some shelter so as to avoid the risk of their all being overcome simultaneously.

Recommendations

The Deputy Chief Inspector recommends that:—

(1) All phases of work involved in reopening a district which has been sealed off following a fire, and in restoring conditions to normal, should be covered by a detailed plan, drawn up in consultation with all interested parties. This plan should not be varied materially, except as may be necessary to deal with an emergency, without fresh consultation. The scheme should provide for the appointment of one senior official to be in charge of all operations on each shift, and for the provision of ample supplies of necessary materials and apparatus such as tools, canvas brattice, materials for temporary stoppings, etc.

(2) Great care is needed in deciding when to attempt to reopen a district which has been sealed off because of fire. A period of longer than six months may well be necessary to allow heated material, particularly coal, to cool down sufficiently. Firedamp will be present in large quantities and in order to ensure that its concentrations do not fall into the explosive range it is necessary to consider whether to attempt to recover the whole of the affected area in one stage, or whether to proceed in several stages.

(3) Restoration of the ventilation must always be treated as a matter of the greatest urgency. As far as possible, accumulations of inflammable gas should be removed as a "plug" and not diluted with fresh air until they are well clear of any ground which may have been affected by the fire. All possible sources of ignition in the path of the gas must be eliminated.

The possibility of an exploration by a team wearing self-contained breathing apparatus and operating through an air lock, should be considered before any attempt is made to restore the ventilation. Steps should be taken to ensure that electric power cannot be supplied to cables or signalling apparatus in the affected part of the mine until the ventilation has been completely restored.

(4) The detailed plan referred to should include the provision of suitable laboratory equipment on the surface at the mine for the analysis of air samples, in particular for estimating percentage concentrations of carbon monoxide to four places of decimals. It should also include the specification of points where air samples should be taken at fixed intervals, bearing in mind that the most significant results will be obtained by taking samples near to any possible, or suspected, site of heating, and that separate spot samples should be taken at different points in the cross-section of a roadway in which only a small quantity of air is flowing.

The results of the analyses of these samples should be plotted at the earliest possible moment on a graph, in such a way that the percentages of the different gases at any time are plainly indicated. These graphs should be kept constantly available to the manager and the senior officials. Where air samples are collected by men wearing breathing apparatus they should be instructed how to avoid contamination with gas exhausted from the relief valve of their apparatus. In every case where carbon monoxide is found in measureable quantity, and where the oxygen deficiency can be reliably determined their ratio should be calculated and shown on the graph.

(5) A physical examination of the district should be made as the fresh air first advances, and no one should be allowed to work without apparatus in a return airway until the whole area is clear of accumulations of gas. The number of men working underground at any time should be kept down to the absolute minimum.

Consideration should be given to the possibility of providing "self-rescuers," *i.e.*, small gas masks which give protection to the wearer against carbon monoxide, for all persons engaged underground in reopening operations where there is any risk of explosion.

Settle Speakman Centenary

Fuel distributors, shippers, wharfingers, wagon repairers, etc., with eight subsidiary companies, Settle Speakman & Company, Limited, Stoke-on-Trent, which in its heyday under the late Sir Francis Joseph was a big owner of collieries in Staffordshire, has recently celebrated its centenary. A well illustrated booklet has been produced to mark the occasion. Mr. W. H. Carroll, members of whose family have helped to guide the group's expansion from the outset, contributes a foreword. The company, which was in the forefront of coal-washing development, set up the first coal washery in south-east England, at Queenborough, Isle of Sheppey.

PRODUCTIVITY RECORD

EAST MIDLANDS NCB STILL LEADS WAY

PRODUCTIVE efficiency in the East Midlands Divisional Coal Board, for years the highest in Britain, rose to new record levels in 1960; coal sales rose by about 3,000,000 tons, and more than 3,000,000 tons of coal was lifted from ground stocks during the year. These salient achievements in the division were announced by Mr. W. L. Miron, recently-appointed chairman, at a Press conference at Nottingham on Tuesday.

As the national production objective during 1960 was to keep output below the estimated level of demand in order to reduce existing stocks of coal, the division had aimed at a saleable output of around 44,000,000 tons. Output, including Small Mines, totalled 44,059,000 tons by the end of the year—a decrease of 718,000 tons, compared with 1959.

MR. W. L. MIRON

Efficiency in the pits continued to rise. Output per manshift at the coal face in 1960 at 119.2 cwt., was 7.9 cwt. more than in 1959 and 25.8 per cent. higher than five years ago. Output per coal-face worker rose by 83.1 tons to 1,182.8 tons. OMS (overall) was 42.1 cwt.—1.5 cwt. more than in 1959 and 14.3 per cent. higher than five years ago, while output per wage earner (all employed) rose by 17.9 tons to 463.2 tons. Compared with the year before nationalization, overall productive efficiency had now risen by no less than 42.7 per cent.

Fall in Sales Halted

Despite growing competition from oil, the falling trend in coal sales, which began in 1957, was reversed. Sales rose by about 3,000,000 tons, and total disposals from the division (excluding by-products) were:—Deep-mined coal, 42,497,000 (39,084,000) tons; opencast coal, 1,566,000 (2,146,000) tons; coke and coke breeze, 648,000 (608,000) tons, Warmco and Warmco nuts, 63,000 (67,000) tons; bricks, 64,188,000 (65,922,000).

With demand for electricity expanding rapidly, said Mr. Miron, disposals of smalls to power stations rose to the record level of 14,750,000 tons—about 1,750,000 tons more than in 1959, and with about 30 per cent. of total national disposals the division was again the largest supplier of coal for electricity generation. New stations, such as Willington "A," which by the end of the year was consuming about 28,000 tons per week, High Marnham (25,000 tons), Drakely "B" (20,000 tons), and Staythorpe "B" (8,000 tons), were supplied exclusively from the East Midlands, and when generating at full capacity would, along with other planned developments, ensure a market for the bulk of the small coal produced in the division for many years ahead.

Pressure for domestic coal was generally much stronger than in 1959, said Mr. Miron, and disposals amounted to about 27 per cent. of the national total. Sales of the smokeless fuels Sunbrite and Warmco and industrial coke also showed some improvement, although there was still more than 1,000,000 tons in stock at the end of the year. Disposals of coking coal, at 10 per cent. of the national total, were lower than in 1959. The iron and steel industry took less coal, although this was offset by increased supplies to other industrial consumers, particularly cement manufacturers.

Total disposals of industrial coal were therefore slightly higher than last year, and the division again supplied about a quarter of the coal used in general industry. As a result of the increasing production of premium smokeless fuels, disposals to gas works increased to about 20 per cent. of the national total. The division also played an important part in the expansion of oversea trade, and with increased sales, principally for electricity undertakings in Denmark and Holland, it now enjoyed about a quarter of the country's total coal exports.

The lifting of more than 3,000,000 tons of coal from ground stocks during the year meant a net reduction in total stocks of about 75,000 tons, in contrast to the rise of 4,000,000 tons during 1959. Further substantial reductions were expected this year. Because of manpower problems, the British Transport Commission was unable to provide sufficient wagons to move the division's coal satisfactorily, and large tonnages were transferred from rail to road. Although serious loss of production was avoided, some 680,000 tons of coal were lost, not lifted, or put to stock, through shortage of wagons.

Turning to the manpower problem, Mr. Miron said that a total fall of 5,328 men was experienced during the year, leaving 92,289 men on the colliery books at the end of the year. Controls on recruitment had been progressively lifted in accord with the needs of individual collieries, and although all suitable juveniles seeking colliery employment were taken on, more could have been accepted in view of the long-term prospects of the division. The number recruited, at 1,859, showed a slight decrease on the 1959 total of 1,882.

Profit for the division for the first half year of 1960 was £11,321,846, after charging all depreciation but before charging interest, against the 1959 half-year figure of £11,195,481. No total figure for the year was yet available, said Mr. Miron, but he felt it would

be "safe to say" that when published it would show the division to have maintained a high level of profitability. Last year the division made a profit, before interest charges, of £17,565,506.

Over 3,000 re-entered the industry as against just under 1,300 in 1959. Recruitment of juveniles (boys under 18) was apparently disappointing—some 1,542 against 1,650 in 1959, but during the first two weeks of 1961 this situation had been retrieved by a very high intake of 218 boys. "We have set our sights at a total recruitment in 1961 of 6,500, including 2,400 boys, and a reduction in our wastage of 3,400," said Mr. Miron. The division would be called upon after about 1962 to make an increased contribution to the national output. It was one of the expanding divisions, and would still need men and boys.

The provisional output of saleable coal from mechanized faces during the year amounted to 25,880,368 tons or 59.08 per cent. of the divisional output, against 23,158,473 tons and 51.93 per cent. in 1959. The types of machine at work had in general been the same as in 1959, but the total number increased from 297 to 321 Tonnage of coal carbonized was 1,100,000 tons, compared with 1,300,000 tons in 1959. The decrease was due to a planned restriction of throughput in view of the coke sales position. Grassmoor Coke ovens were closed and the other plants operated at levels below their maximum.

Steel Division's Boost to Cranleigh Group's Profits

CURRENT trading in the steel division of Cranleigh Group, Limited, Manchester, which comprises the Millom Hematite Ore & Iron Company, Limited, with its wholly owned subsidiary, the Millom Hematite Iron Company (Sales), Limited, is still very satisfactory, but the recent increase in furnace-coke prices has adversely affected costs of pig-iron production, states Mr. David Blank, chairman, in his annual statement to shareholders. There may be difficulty in reaching the 1959-1960 figures he says, but there is every reason to hope that results will not compare unfavourably.

Profits of the steel division were the chief reason for the sharp jump in last year's profits of the Cranleigh Group, accounting for 60 per cent. of pre-tax profits. Mr. Blank states that certain negotiations at advanced levels lead him to believe that the undertaking should be able to make favourable acquisitions during the current year, further increasing the profitability of the group. Propositions explored last year were uneconomic in price or unfavourable for other reasons, and he repeats that the board is not prepared to acquire businesses merely for the sake of becoming bigger.

GEC Research Reorganization

UNDER reorganization plans announced by Mr. O. W. Humphreys, research and technical development director of the General Electric Company, the company's research laboratories are to be autonomous research units to serve the separate operating groups of the company. The Wembley laboratories are renamed the "Hirst Research Centre"—a tribute to Lord Hirst, who founded the UK company.

Changeover will be gradual and at first only two main research units are planned—the central research laboratories responsible for fundamental work, and the telecommunications and engineering research laboratories.

US Loan for New Turkish Steel Complex

NEW steel industry in Turkey, on the Black Sea coast at Eregli, is to be financed by the Turkish Government, the US Development Loan Fund, and Turkish and American private capital. The proposed integrated steel plant will consist of blast furnaces, coke ovens, a basic oxygen plant, rolling mills, and a power and steel plant. The country's present steel plant at Karabuk produces only basic steel products, but the new plant will manufacture flat steel products for the first time in Turkey. Its estimated initial output will be 470,000 ingot tons a year, with an eventual capacity of over 1,000,000 tons a year.

Of the total cost of $258,000,000, the Development Loan Fund is supplying $129,600,000 (over £46,000,000), Koppers Company, Inc., Blaw-Knox, and Westinghouse Electrical International, are putting up $14,000,000 between them, and a further $5,000,000 is being supplied by Chase International Investment Corporation, New York. Turkish capital totals $11,000,000 and the OEEC is providing a $20,000,000 credit.

Big Increase in British Exports to China

BRITISH exports to China in the first 11 months of 1960 increased 50 per cent. over 1959, the biggest percentage rise in exports to any single market. "For the first time since 1952 there is a likelihood of Britain's supplanting Western Germany as China's principal trading partner in Western Europe," states the China Trade and Economic Newsletter, in its January issue.

Imports from China increased 25 per cent. during the same period, but the balance of trade is over £8,000,000 in Britain's favour.

The Newsletter suggests that, despite China's natural calamities, industrial output will not fall far short of the planned 29 per cent. increase. Steel production is likely to slightly exceed the target figure of 18,000,000 tons, the planned increase in production of electric generating equipment will be more than fulfilled, and most of the 1960 targets for heavy industry—pig-iron, coal, electric power, machine tools, tractors—will be reached, if not exceeded.

Poor UK Response to Canadian Industrial Show

LACK of interest by UK engineering companies in exhibiting at the National Industrial Production Show of Canada, at Toronto from May 8-12, has been "very disappointing" to the Board of Trade, which is paying more than half the cost of the stands. Of more than 8,000 firms circulated—twice as many as previously—only a dozen have taken space, leaving about 16 stands to be filled.

The show is considered to be important to the machine-tool industry, not one member of which has shown any interest in exhibiting. The Board of Trade has put the overall cost of exhibiting in Canada at a little over £250.

ABOUT 18,500,000 metric tons of steel were produced in Communist China last year, 5,000,000 tons more than in 1959, Chinese sources report.

IRON AND STEEL TRADE

SIGNS already evident last month of the effect on the industry of the continued recession in the motor-car industry, are now more pronounced. In the South Wales area sheet and tinplate manufacturers are experiencing a reduced demand, but on the North-east Coast, where the industry is keyed very largely to the healthy market for heavy products, outputs of both steel and pig-iron are the highest for any area. The heavy side of the industry has every reason to be confident with order-books already well filled for the first six months of 1961 for plates, sections, reinforcing bars, and merchant bars.

Pig-iron

Supplies of all grades of pig-iron are at present more than adequate to meet the demands of the foundries for both stock and consumption requirements and most producers would have no difficulty in stepping up deliveries appreciably if business warranted. The engineering foundries have no difficulty in obtaining enough of the low phosphorus irons and hematite, and for that matter, the refined irons.

There is plenty of high phosphorus iron and the furnaces could do with additional orders to enable them to reduce stocks and keep a large quantity moving from current output to avoid double handling from stock. Generally there is little forward buying, apart from some brands of low phosphorus irons and hematite, production of which are limited.

Ferro-alloys

There is no further change in the price of ferro-tungsten this week and the demand has kept steady. Ferro-vanadium is fairly active and there is a steady request for ferro-molybdenum. The major grades of ferro-silicon are well supported, and ferro-chrome is active. Calcium silicide, ferro-manganese, and silico-manganese are in good demand.

Interest in ferro-niobium and ferro-titanium is maintained.

Semi-finished Steel

There is little or no diminution in the activity of the re-rollers and although demand has fallen off for some of their products—chiefly bright drawn bars and strip for the motor industry—they have good order-books for small bars and light sections. There is no lack of call for reinforcing rods.

Most of the re-rollers are well provided with mild steel semis and home steelworks are easily able to satisfy the present demand. All arisings at the steelworks of suitable re-rolling defectives and crops are readily accepted.

Finished Steel

Unfortunately there are still no indications of any resuscitation in the demand for colliery requisites, such as light rails, arches, pitprops, benk and W bars, and a greater call for hot rolled strip and black sheets would also be appreciated by the makers.

There is, however, no let-up in the pressure on makers for sections and joists and, generally speaking, new business is placed for forward delivery. The platemakers are finding difficulty in maintaining delivery promises, especially those who undertook additional commitments on the assumption that new plant would be able to cope with the greater tonnage involved.

HEATRAE, LIMITED—Mr. G. W. Flint has been appointed a director.

Ore Chartering

IN general, markets show no particular change, but in many sections there is quite a steady undertone and owners are hoping for some improvement in rates. From certain areas it is noticeable that charterers have been compelled to improve on recent fixtures and today the Far Eastern market is much steadier.

There is a good enquiry from India. Marmagoa/Japan reports 44s. f.i.o.t. for 10,000 tons, January 11/31, and to the Adriatic 46s. 3d. on same terms for 9,500 tons, 10 per cent., February 1/28. East coast India/Poland paid 64s. f.i.o.t. for 12,000 tons 10 per cent. late January. Abou Zenima/Ymuiden or Amsterdam is reported fixed at 37s. 6d. for 9,800 tons February 9/28 on gross terms, and from West Africa, Konakri/Gdynia or Gdansk, 18,000 tons for February fetched 27s. 6d. f.i.o. and trimmed. Other West African fixtures include Pepel/Continent for second half February at 27s. 6d. and Safi/U.S.N.H., about 8,000 tons of manganese for January loading at $4.70.

As far as the Mediterranean trades are concerned, only very few fixtures have been reported. Bauxite from Toulon to Newport is only slightly steadier at 21s. for 9,400 tons in the second half of January, and a small cargo of chrome has been fixed Aghia Marina/Middlesbrough at 69s., gross terms, for January. On actual fixing, Casablanca phosphate does not appear to be an active market but a 4,000-tonner for late February/March 10 has been fixed to Garston at 37s. 9d. and 8,500 tons in the second half of January to Immingham fetched 26s. 6d. Two vessels ranging between 9,000/10,900 tons have been fixed from Tampa to Moji-Miyako Range for January and February, both at $8.25 f.i.o. and trimmed.

UK COMPANIES' INTEREST IN HAIFA FORGING PLANT

TWO British firms are to invest in a large new forging plant near Haifa, for which the cornerstone was laid on Wednesday. The plant, which requires the investment of £600,000, is to serve the whole of the Israeli metal industry, as well as engage in export. The British firms participating are Forgings & Presswork, Limited, Birmingham, and B. & S. Massey, Limited, Manchester. Two other UK firms are negotiating for participation.

The project was initiated by Argat, a company recently formed by the Israeli Government to start essential industries which will be sold to private individuals or groups of interested investors.

Board Changes

Retirement After Half-Century with GEC

AFTER 50 years' service with the company, Mr. A. S. Black, a director of the GENERAL ELECTRIC COMPANY, LIMITED, and area manager for Scotland, has retired. He is succeeded by Mr. John S. Langlands, previously assistant manager for the area. Mr. Black joined GEC in Glasgow in 1910 and started the branch in Edinburgh in 1919. In 1937 he became area manager for Scotland and was appointed to the board in 1949.

After an apprenticeship in the Clyde shipyards, Mr. Langlands joined GEC in 1933, went to Canada in 1948 and formed the British General Electric Company (Canadian), Limited, becoming vice-president and managing director. He returned to this country in 1954 to become assistant area manager for Scotland.

SERCK, LIMITED—Mr. Edward B. Leach has been elected to the board.

STORDY ENGINEERING, LIMITED—Mr. W. G. J. Appleton has joined the board.

WARSOP POWER TOOLS, LIMITED—Mr. W. G. C. Backinsell has resigned from the board.

BRAITHWAITE & COMPANY, ENGINEERS, LIMITED—Mr. H. W. T. Hain has joined the board.

AVO, LIMITED—Maj. William Logan, general sales manager, has joined the board as sales director.

THERMAL SYNDICATE COMPANY, LIMITED—Mr. John C. Pipkin, secretary, has been appointed to the board. He has been with the company for 39 years.

THOMAS ROBINSON & SON, LIMITED—Mr. Leslie Smith has retired from the board, but will remain as consultant.

BRITISH BENZOLE & COAL DISTILLATION, LIMITED—Mr. N. L. Goodchild has resigned from the board. Mr. W. R. Mason, secretary, has been appointed a director.

GEORGE KENT, LIMITED—Mr. R. G. Kent has been appointed deputy chairman in place of the late Mr. T. P. W. Norris and Mr. W. A. H. May has been elected assistant managing director.

THE PATENT SHAFT STEEL WORKS, LIMITED—Mr. Bryan Charles Bruce-Gardner, a director of the company, and general manager of the works at Wednesbury (Staffs), has been appointed managing director.

ABERDARE HOLDINGS, LIMITED—Lord Ward of Whitley has joined the board and those of the subsidiaries, Aberdare Cables, Limited, Aberdare Engineering, Limited, and South Wales Switchgear, Limited.

FIRTH-VICKERS STAINLESS STEELS, LIMITED—Mr. A. G. Cleghorn, general manager, Blackheath works, Birmingham, and Mr. W. H. Wentworth Ping, general sales manager, have been appointed special directors.

G. A. HARVEY & COMPANY (LONDON), LIMITED—Mr. D. K. Fraser, joint managing director, has been appointed managing director. Mr. H. E. Cooper has relinquished his office of joint managing director, but remains on the board.

METAL MOULDINGS, LIMITED—Mr. L. Graham Firth has been elected chairman in succession to Mr. N. G. Welch, who has resigned from the board, and Mr. Ivor Slater has been elected a director and Miss E. M. Young a special director.

METAL INDUSTRIES, LIMITED—Mr. R. J. F. Howard has been appointed a director of marketing. He was previously a director of Lancashire Dynamo Electronic Products, Limited. He remains a non-executive director of that company and also joins in a similar capacity the boards of five other subsidiaries:—Brookhirst Igranic, Limited, Lancashire Dynamo & Crypto, Limited, Foster Transformers, Limited, J. G. Statter & Company, Limited, and Lancashire Dynamo Nevelin, Limited.

FAWCETT PRESTON & COMPANY, LIMITED—Mr. D. D. Teasdale, secretary and chief accountant, has been appointed general manager and has joined the board of the company which is a member of the Metal Industries, Limited, group.

G. BEATON & SON, LIMITED—Mr. Ronald W. Creber has joined the board of the company, a member of the George Cohen 600 Group, Limited. He joined the company in 1941 and has been in charge of the design department with the additional duties of technical sales manager.

GAS PURIFICATION & CHEMICAL COMPANY, LIMITED—Following the resignation of Vice-Admiral Sir Charles Hugh Hallett as chairman on a matter of policy, Mr. D. D. Mathieson (deputy chairman) has been appointed chairman to succeed him. Mr. Mathieson joined the board in 1955.

G.K.N. REINFORCEMENTS, LIMITED—On relinquishing his executive duties with the group, Mr. C. R. Wheeler has resigned as chairman. He is succeeded by Mr. N. R. R. Brooke, managing director of Guest, Keen & Nettlefolds (South Wales), Limited, and a director of the company for many years. Mr. H. W. A. Waring and Mr. L. R. P. Hugh have been elected to the board of G.K.N. (South Wales), Limited, in place of Mr. Wheeler and Mr. T. Jolly, who have resigned.

WICKMAN, LIMITED—Mr. H. B. Morris has been appointed to the board. He joined the company in 1938 and 10 years later was transferred to the subsidiary, Arc Manufacturing Company, Limited, as chief accountant and later became secretary. In 1955 he was appointed secretary to the parent company.

WRIGHT MACHINERY COMPANY, LIMITED—Mr. Robert G. Hess and Mr. A. N. Wiley have joined the board. Mr. Robert Broadbent has been appointed chairman and Mr. M. L. Jofeh, a director. Mr. Hess is president of Wright Machinery Company (United States), and Mr. Wiley is vice-president and manager, machinery products, of that company.

GRAHAM FIRTH STEEL PRODUCTS, LIMITED—Mr. L. Graham Firth has been elected chairman in succession to Mr. E. H. King who retains his seat on the board. Mr. A. R. Lancashire has been appointed assistant managing director and Mr. Tom C. Firth and Mr. R. Ivor Slater have joined the board. Mr. N. G. Welch and Mr. B. J. Byrne have relinquished their seats on the board and Mr. H. J. Nash has succeeded Mr. Byrne as secretary.

Award Scheme for Apprentices

"APPRENTICE of the Year" scheme, inaugurated in 1958 by the British Junior Chambers of Commerce and extended in 1960, is to be extended further this year. In addition to awards of nine months in Australia for the best technical apprentice, six months in West Germany for craft apprentices, and six months in the US for commercial apprentices, the age limit for technical and commercial apprentices is to be raised and subsidiary awards made to all regional winners who attend the national finals. These will probably take the form a short visit to an industrial centre in Europe.

Details of the scheme, the closing date for which is March 1, may be obtained from Mr. Peter Rex, Kalamazoo, Limited, Northfield, Birmingham (telephone: Priory 2191).

THE COAL TRADE

THERE seems to have been no respite, however brief, for merchants to replenish stocks and if they do not regard their fast dwindling reserves with alarm, then it is with no little anxiety, realizing that unless they do get regular and full forwardings, they cannot hope to meet the demand which is not likely yet to have reached its peak. Bad though the weather has been it is unlikely that it will take a sudden and sustained turn for the better. It is a pity that when so much has been put into popularizing solid fuel both for domestic and industrial purposes, extraneous circumstances should conspire to make things difficult to maintain the service promised by widespread publicity.

DURHAM AND NORTHUMBERLAND

Buoyancy in the iron and steel trade is reflected in the heavy demands for coking coal and industrial cokes. While regional demand for fuels from the engineering industries has shown some contraction, the effect of this is not apparent on Durham and Northumberland large and superior graded steams, all of which are well booked. Power stations are taking larger quantities of inferior sorts than a year ago.

There is a consistent domestic demand. Household cokes move steadily and demand outstrips supplies of processed, named, and smokeless solid fuels. In the export section, there is rather more inquiry about, and quite an encouraging volume of business has been done over the first quarter of this year. With the widening scope in Scandinavian and Continental markets has come lively competition among exporters to secure the business, and quotations are keen.

SCOTLAND

Glasgow—Brisk conditions pervade all sections of the trade, and there is no immediate prospect of any letting up. The divisional board has already liquidated almost all of the small tonnage of large coal left on its hands during the summer and its stock of nuts is being whittled down rapidly to meet the strong demand for supplies in the domestic market. Merchants complain of inadequate quantities of large coal and are drawing heavily on their stocks, which are now reduced to around last year's level of 180,000 tons. Anthracite stove nuts are very difficult and more and more merchants are refusing to accept further orders.

Processed fuels, notably Coalite and Phurnacite, fall far short of requirements, and are being supplied to "customers only" at both wholesale and retail levels. Good supplies of gas coke and hard coke nuts are available, but while these are having to be accepted more readily in view of the scarcity of other alternatives, few consumers have the necessary appliances to obtain good results from them.

A strong demand in the industrial sector is accentuated by extremely high throughputs at power stations, which have been using 20 per cent. more than a year ago. In the process their stock has fallen to 300,000 tons against 500,000 tons last year and it is plain that the present strain on washed and untreated smalls and duff will continue for the next month or so. Pearls, singles, doubles, and trebles are caught up in the pressure for supplies, and all are sold well ahead.

Fife and Lothians—Production in both zones keeps on a steady level, and with a strong demand for all descriptions everything is clearing promptly. Inquiries from the Continent are more frequent, but these cannot be entertained in view of the heavy commitments in the inland market.

Coal Provides Record OMS for New Year

PEAK output per manshift figures for coal of 28.83 cwt. overall and 83.76 cwt. at the face gives an excellent start to 1961 and with production back to normal at 3,904,100 tons, no one can say that the miner is not doing his share towards meeting the demand. Consumption, however, is running at over 4,500,000 tons and the consequent stocklift has brought reserves at pithead and open-cast sites down to under 29,000,000 tons, compared with over 35,500,000 tons a year ago.

There were 583,090 wage-earners on colliery books on January 7, against 633,110 on January 9, 1960, the numbers engaged at the coal face being 220,340 and 242,900 respectively. Total absenteeism (all workers) in the week ended January 7, was 17.32 per cent., compared with 14.85 per cent. in the week ended January 9, 1960. Output at the face was 4.188 tons and overall 1.443 tons in the week ended January 7, compared with 3.818 and 1.363 tons in the week ended January 2.

The following table gives (in tons) the revised output of saleable mined coal by division in the week ended January 14, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended January 14, 1961.		Week ended January 16, 1960.
	Total output.	Tonnage lost.	Total output.
Scottish ..	344,000	7,000	375,000
Northern (N&C) ..	245,000	—	249,000
Durham ..	467,000	—	467,000
North-Eastern ..	827,000	33,000	859,000
North-Western ..	257,000	—	274,000
East Midlands ..	900,000	—	916,000
West Midlands ..	279,000	—	306,000
South-Western ..	377,000	10,000	414,000
South-Eastern ..	33,000	—	30,000
Great Britain—			
Deep-mined coal ..	3,729,000	50,000	3,890,000
Other deep-mined (including licensed mines) ..	38,000	—	50,000
Open-cast coal ..	137,000	—	159,000
TOTAL	3,904,000	50,000	4,099,000

CHARLES ROBERTS & COMPANY, LIMITED—Mr. Duncan Bailey has resigned as chairman and Mr. Russell Bailey has been appointed chariman and managing director. Mr. Duncan Bailey has spent 61 years with the company, 33 of them as chairman.

Coalfield News

PRESIDENT of the Yorkshire Winding Enginemen's Association, Mr. Frank Cope (64), was re-elected at the annual meeting in Barnsley last week.

FOR THE 27th successive year Mr. George W. Dixon (71) has been elected treasurer of the Wheatley Hill branch of the Northumberland and Durham Miners' Permanent Relief Fund.

OF THE 280 miners at Clydach Merthyr Colliery (Glam), 70 were transferred on Monday to Brinlliw Colliery and the other 210 will be transferred there in the course of the next two months.

COAL AND COKE shipments from the South Wales ports last week recovered to 58,224 tons, 1,373 tons better than the previous week. The total was, however, 2,752 tons less than a year ago.

FOR SOME TIME undermanager at Arkwright Colliery (Derbyshire), Mr. C. Beaver has moved to become undermanager at Glapwell Colliery. He has been succeeded at Arkwright by Mr. G. Wood.

INQUEST on the victims of the Six Bells Colliery disaster, which was to have been resumed on Wednesday, has been adjourned to February 15 by which time it is expected that the report of the inquiry into the accident will be ready.

AFTER a second ballot for the post of general secretary of the Lancashire area of the National Union of Mineworkers, Mr. J. Gormley, winner of the first ballot, topped the poll with a majority of 3,234 votes. He took up his duties on Monday.

Mr. S. CHEESBROUGH, who has retired from Allerton Bywater Colliery, near Kippax (Yorks), after 52 years' mining service, has served as chairman of Kippax Parish Council, secretary of Kippax Scrap Metal Committee, and on the Allerton Bywater Colliery Consultative Committee.

COLLIERIES in the Doncaster area have rephased their shifts so that the late shift workers have more time for social life in the evenings. Some of the pits now start the afternoon shift at 1.45 p.m. so that it finishes at 9.30 p.m. instead of at 10 p.m., while others are starting at 1.15 and leaving off at 9.0.

NEW LOCKER ROOMS, baths, medical centre, and canteen at Bilston Colliery, near Edinburgh, were officially opened on Thursday of last week by Mr. James Lindsay, the oldest worker at the colliery. Work on the new £10,000,000 pit started eight and a half years ago, and the new centre has cost about £115,000.

DEMOLITION WORK at the disused Bonds Main Colliery, near Chesterfield, has now begun. Within a few months both shafts will be filled in and apart from two electricity sub-stations, all buildings will be demolished. The first shaft of the pit was sunk in 1898 and it was closed 11 years ago when it became uneconomical.

THREE OUTPUT RECORDS were achieved by the West Midlands Divisional Coal Board in December. Output per manshift rose by ¾ cwt. overall to 29.4 cwt. per manshift and at the face it reached 93.3 cwt. The North Staffordshire Area became the first area in the division to exceed 5 tons per manshift in a month with an output per manshift of 101.3 cwt., while Warwickshire set a new record of 30.5 cwt.

LANARKSHIRE COUNTY COUNCIL, whose area contains some of Scotland's biggest mining communities, has refused to abandon oil in favour of coal for heating purposes, in spite of representations by the NUM, the general council of the Scottish TUC, and the NCB. It is to adhere, wherever possible, to its present policy of installing oil-fire heating systems in all schools at present commissioned from private architects.

SUGGESTIONS that miners were spending their working time looking after pheasants on the National Coal Board estate occupied by Mr. Tom Wright, general manager of the No. 5 Area of the East Midlands Divisional Coal Board, were denied by a NCB official last week. He said that Mr. Wright owned the pheasants with a syndicate of 10 other sportsmen and that if miners acted as beaters they did so in their own time and were paid by the syndicate.

Coal Chartering

RATHER more activity is reported from the Hampton Roads coal market although the main interest is still on Japanese account. For January/February positions tonnage of about 9,500 tons have been fixed at $8.40 and $8.45, whereas 14,000 tons for March 1/April 10 secured $8.50 and similar size to Kawasaki direct for April shipment 10 cents less. Inquiry is maintained. As far as South America is concerned 11,500 tons for end January/February 6 has been fixed to Rio de Janeiro at $5.20, whereas for all February positions two vessels, of 13,500 tons and 14,500 tons respectively, obtained $5.25, and to the Lower Plate, basis Buenos Aires, 9,500 tons for January 25/February 10 fetched $5.80.

More interest is noted on West Italian account and 9,500 tons for prompt was fixed at $4.90 to West Italy or Cagliari and there are inquiries in the market for tonnage on a contract basis from the Roads to the Italian Adriatic. Tonnage has also been taken to load petroleum coke from Port Arthur—9,200 tons to Marseilles for January at $6.60 f.i.o., and 11,500 tons for Rotterdam January 21/26, at $5.30.

From the Continent, Poland/Port Said arranged 2,200 tons of coke for January at 49s., and 11,500 tons of coal to West Italy for February 4/18 fetched 26s. 6d. Other miscellaneous fixtures include Chinwangtao or Dairen/Hongkong, 8,000 tons 10 per cent., at 20s. f.i.o.t., 1,500/1,000 tons for the end of January/February and Durban/Rangoon, 8,500 tons 10 per cent., at 51s. f.i.o., 800/1,000 tons, for January 23/February 10.

Four Lancashire Pits to Close

FOUR collieries in the North-Western Division of the National Coal Board—Newton and Wheatsheaf in the East Lancashire Area, and Wigan Junction and Standish Hall in the West Lancashire Area—are to cease production this year. All are nearing the end of their coal reserves. Newton was sunk in 1879 and employs 360 men and Wheatsheaf was sunk in 1846 and employs 443 men. Wigan Junction, sunk in 1887, employs 299, while 402 men work at Standish Hall—a drift mine opened in 1948.

All the men will be absorbed by other collieries in the Division and the Board's recruiting drive will continue unaffected. No definite dates have been fixed for the closures, which will be phased so that redeployment will cause the least possible inconvenience to the miners.

PYRENE COMPANY, LIMITED, fire extinguisher manufacturers, of Brentford (Middx)—The business of Perfichrome, Limited, electroplaters, of Brownhills (Staffs), has been acquired. The business will be operated as a separate division of the company, and will be known as the Perfichrome division.

PACKED COAL BOOM

Marketing Feature in Scottish NCB's Year

USE of slot machines to sell coal, following a 500 per cent. rise in the demand for the 28 lb. bags since their introduction last year, is being considered by the Scottish Divisional Coal Board. This was among features announced by Mr. R. W. Parker, divisional chairman, in his annual review of progress during 1960. Predicting a " great future " for this method of distribution, he said that at present 20,000 bags a week were sold in Edinburgh, and the division planned to double the trade by the end of 1961.

Output of deep-mined coal, at 18,000,000 tons, was close to the target for the year, said Mr. Parker. Demand for coal in Scotland had increased, productivity had gone up, and in the latter months of the year the mines were again open for full recruitment. Stocks of unsold coal, which in December, 1959, amounted to 1,400,000 tons, were reduced by about 800,000 tons to a total of 600,000 tons at the end of 1960.

Mr. Parker said that the division's financial losses, although inevitably high, were substantially less than the £13,000,000 in 1959. Capital expenditure in 1961 would also drop by about £1,000,000.

Record Productivity

As in 1959, there was a further improvement in productivity in the division: OMS at the coalface was 61.2 cwt. compared with 57.5 cwt. in 1959, and OMS overall was 22.4 cwt. against 21.3 cwt. previously. The overall figure of 22.4 cwt. represented an increase of over 5 per cent. on 1959, compared with a national increase of about 4 per cent. Causes of the improvement were the increase in power-loading, the effect of closing some low productivity pits, and the build-up of output in new and reconstructed pits.

The fall in the demand for coal took a definite change about midsummer, affecting most markets except gas and railways, and by the end of the year sales were substantially higher than in 1959. Factors affecting this were the higher level of industrial activity in Scotland, particularly in the steel industry; bad weather during the summer, and the increasing effect of the board's sales promotion campaign.

The board's packed fuel plant, started towards the end of 1959, had introduced the domestic consumer to the advantages of the smaller sizes of coal on the open fire, and provided a service outside normal delivery periods. The coal was pre-packed in 14 lb., 28 lb., and 56 lb. packs, and the service had been so successful that despite the doubling of the capacity of the plant, it was already almost continuously employed.

" We supply packaged coal to Edinburgh and last year we were selling between 20,000 and 25,000 bags a week," said Mr. Parker. " The special plant will be extended for the second time, and we should reach up to 40,000 bags a week." The question of a slot-machine service was being studied.

The board had also introduced bulk delivery of coal by conveyor belt system from a road vehicle, to industry, schools, hospitals, etc. This ensured not only the clean delivery of industrial coal, but, in many cases, permitted speedy delivery to somewhat inaccessible stokeholds.

Turning to the production sector, Mr. Parker said that progress in the extension of power loading continued during the year, and 33 per cent. of the total divisional production was raised in this way—10 per cent. more than in 1959. The production programme for 1961 envisaged a further increase in power-loading. A few installations of self-advancing roof supports were completed, and valuable experience was gained in the operation of this new mining development.

Mr. Parker said that the build-up of output at reconstructed pits had continued, but difficult mining conditions had persisted at Rothes, Kinneil, and Glenochil collieries, and both Bogside and Overton had had teething troubles to overcome. At Bowhill, production started in September from the new shaft at No. 3 Pit.

Dollar Mine was now coming into production and Polmaise 3/4 would, towards the end of the year, also be producing Hirst coal specially for the Kincardine power station.

Closures in 1960 had affected about 2,000 workers, but in nearly all cases alternative employment in other pits was provided. The tonnage of coal lost through unofficial stoppages amounted to 260,000 tons—the same amount as in 1960 and 93,000 tons less than in 1958.

During the first six months of the year the board had continued its policy of reducing manpower through restricting recruitment and allowing wastage to take its course. By July, however, the need for the rundown of men ended and recruiting was resumed, at first selectively, and then on a full scale. By the end of November the number entering the industry broadly balanced wastage and stabilized manpower at about 70,500 men. Over the year, the total number recruited was 5,979—an increase of 3,643 over 1959—made up of 1,817 juveniles, 3,615 ex-miners, and 547 new adult entrants.

It was the board's intention to hold manpower only a little below the present figure of 70,500, and to do this would require the recruitment of about 7,000/8,000 men and boys in 1961.

During the year special measures were taken to raise the percentage of large coal being produced. The method study staff had concentrated on this problem and on reducing the degree of degradation between the coal face and the wagon. Despite the increase in the amount of power-loading, the downward trend evident in previous years had been arrested.

Efforts continued to reduce the number of accidents in the division. There were 49 fatal accidents in 1960, compared with 47 in 1959 (excluding those who died in the Auchengeich disaster), and the provisional figure of serious (reportable) accidents in 1960 was 251 compared with 303 in 1959. The estimated accident frequency rate per 100,000 manshifts was 132.

Obituary

PROF. A. CAMPION

FORMER Professor of Metallurgy at the Royal College of Science and Technology, Glasgow, Prof. Alfred Campion died on Monday of last week at the age of 86. He played a leading role in the foundation of the Scottish branch of the Institute of British Foundrymen in 1910 and was a past-president. For his contribution to its technical and scientific literature, the institute awarded him the Oliver Stubbs Gold Medal and made him an honorary member.

In 1903, Prof. Campion's technological papers earned him the distinction of being the first Briton, and only the second person ever, to receive the Iron and Steel Institute's Carnegie Gold Medal. He was a fellow of the Royal Institute of Chemistry and became technical consultant to the International Meehanite Company, Limited, shortly after its establishment in this country in 1935.

Former managing director of Cook & Nicholson, Limited, file manufacturers, of Monkwearmouth, Sunderland, Mr. SIDNEY EARL WATSON died on Monday. He was 92.

Mr. J. G. WILLIAMS, first president of the Birmingham branch of the Institute of Welding, has died. He retired about three years ago from the post of district manager of British Oxygen Company, Limited.

The death has occurred at the age of 58 of Cmndr. JOHN ROLAND PATTERSON, technical secretary for eight years of the Parsons and Marine Engineering Turbine Research and Development Association, Wallsend (Northumberland).

Mr. WILLIAM CECIL MINSHALL, construction engineer with John Summers & Sons, Limited, steel manufacturers of Shotton (Ches), has died aged 59. He had been with the firm since 1936 and played a leading part in the development and construction of steel mills.

Mr. A. W. V. AGUTTER, a director of Centaur Tool Works, Birmingham, subsidiary of the Coventry Machine Tool Works, Limited, to which board he also belonged, has died aged 63. In 1954 he was elected president of the British Association of Machine Tool Merchants.

Founder and managing director of the Scottish Wire Rope Company, Limited, Mr. JAMES KENNEDY died on Saturday at the age of 78. He founded the company in Glasgow, in 1922, and was for many years a member of the executive of the Federation of Wire Rope Manufacturers.

Mr. RICHARD RICHARDS, principal of the Powell Duffryn Mining School at Britannia (Glam), from 1940 until his retirement in 1950, has died. Educated at University College, Cardiff, he was appointed lecturer at the Treforest School of Mines in 1914 and became head of the Mine Department in 1936. He was a leading member of the South Wales Institute of Engineers, to which he read papers on mining and geology.

The death occurred last week of Mr. JOHN HOUGH MORRIS, a director of Platt Bros. & Company, Limited, textile and general engineers, of Oldham, and chief buyer in the central purchasing department of Textile Machinery Makers, Limited, Oldham, the parent company. After ore mining in North Africa and Spain, he returned to England to take up a post at Peel Hall Colliery, Little Hulton (Lancs), and became manager of Mostyn Colliery (Platt Bros.) in 1942.

No Government Lead on Export Problems Crisis, Says TUC

HEADED by Mr. Harry Douglass, general secretary of the Iron and Steel Trades Federation, leaders of the TUC last week told Mr. Selwyn Lloyd, Chancellor of the Exchequer, and Mr. Reginald Maudling, President of the Board of Trade, that the root of Britain's export and balance of payments difficulties was neither "high wages" nor "union restrictive practices," but the "lack of cost consciousness" among employers. They also criticized the Government for failing to give a lead on export problems and asked for the establishment of export promotion councils in individual industries.

According to Mr. Douglass, the response to the suggestions was encouraging. "The Chancellor said it might be a good thing to bring such councils down to lower levels in industry and workshops," he said. On export questions, Mr. Douglass added that the TUC would consider "anything Mr. Lloyd would like to put to us. I know we are not perfect. There are some difficulties on our side, but more on the employers' side."

The deputation told Mr. Lloyd it was untrue that high wages were forcing Britain out of export markets. "On the Continent they are not only catching us up in respect of wages but—if you take welfare benefits into account—are passing us."

The important factors in exports were salesmanship, plant, research, fluctuations in stock, and—most important of all—Government policies. All these were outside union control which only extended to manpower. "The Government should prompt firms to be more cost-conscious and find out why, if at all, they are behind our competitors on the Continent," Mr. Douglass said.

Recent Wills

WEBSTER, H. T., former undermanager at Dinnington Colliery (Yorks) ... £3,347

SEDDON, J. T., one time colliery salesman for the Wigan Coal & Iron Company, Limited ... £4,567

SWINNEY, EDWARD, chairman of Swinney Bros., Limited, engineers and ironfounders, of Morpeth (Northumberland) ... £34,894

LOWE, SIR LIONEL, member of the National Coal Board, 1946-51, and a director of Milford Docks Company, Limited ... £31,873

DUMBLE, W. L., Area chief engineer in the No. 3 Area (South-East Durham) of the Durham Divisional Coal Board ... £3,377

WATSON, W. M., constructional engineer, of Robert Watson & Company (Constructional Engineers), Limited, Bolton (Lancs) ... £11,016

HERDMAN, MAJ. H. P., divisional estates manager of the South Western Divisional Coal Board until his retirement some years ago ... £60,279

ROBERTSON, W. H. A., founder of W. H. A. Robertson & Company, Limited, rolling mill and metal machinery manufacturers, of Bedford ... £48,304

ATKINS, JOHN LLOYD, director and deputy chairman of Dowlais Gas & Coke Company, Limited, Dowlais (Glam), until nationalization ... £5,527

MAWLE, E. E., chairman and managing director of the Meadow Foundry Company, Limited, engineers and ironfounders, of Mansfield (Notts) ... £50,867

WEEKS, LT.-GEN. LORD, former chairman of Vickers, Limited, and of the Finance Corporation for Industry, and a director of a number of companies ... £84,118

MARLEY, BRIG. C. D., marketing director of the Durham Divisional Coal Board and a former director-general of the North German Coal Control ... £21,385

CHALMERS, ROBERT ARTHUR, at one time managing director of Tecalemit, Limited, lubrication, hydraulic and filtration engineers, of Brentford (Middx) ... £73,897

PHILLIPS, DAVID LUTHER, head of the Sketty Hall laboratories of the British Iron and Steel Research Association for eight years until he retired in 1954 ... £3,617

Future of ECSC Coal

RATIONALIZATION AND HARMONIZATION PROPOSALS

REDUCTION in the price of energy in the European Coal and Steel Community to the most favourable level from the economic point of view is the general aim of proposals submitted to the ECSC Council of Ministers by the inter-executive working group on energy. The group consists of representatives of the High Authority and the Commissions of the Economic Community and Euratom. It is emphasized that the ECSC coal industry must be given time to rationalize the process of coal extraction and to re-employ the working population in those regions affected by mine closures.

The achievement of a common market for all forms of energy, to which member states are committed by ECSC treaties, implies the establishment of a common commercial policy with regard to third countries, a certain harmonization of rules of competition, and a reduction of artificial price disparities between the various countries.

Adaptation of commercial policies with regard to third countries is recommended, in particular the harmonization of tariffs and quotas on imported coal, in co-ordinating the attitude to be taken to countries with state monopolies, and in organizing the systematic communication of agreements reached with third countries and in avoiding dumping.

Artificial Price Disparities

Regarding the present artificial price disparities between member countries, it is suggested that member governments should compare the situation in this respect and a reduction in prices in those countries where they are highest should be envisaged. The social charges resulting from the earlier retirement of a certain number of miners should be transferred to the state so as not to weigh on the coal industry itself. The group also suggests that member governments should not take in isolation measures in the field of energy policy without first having consulted the Community and European executives.

As further serious disturbances of the energy market cannot be excluded it is advised that precautions should be taken now in order to avoid delays in working out appropriate remedies.

Criteria which would justify action on a Community scale should be agreed and should take into account short-time working in the mines, reduction in energy prices, and increases in coal stocks. The existence of a situation justifying intervention would be recognized by the Council of Ministers at the request of a member country or of an executive; and it is considered that members' governments should now agree on the methods of intervention.

A first method might consist of limiting quantities offered by a system of import quotas for coal, oil, and oil products; a second might be to act not only on quantities but on prices—for instance, by a system of import levies or by the introduction of purchase taxes or custom duties. A third—which would, however, raise legal problems—might be to subsidize ECSC coal without further increasing the protection given to internal sources of supply.

In conclusion the Council is invited to agree in principle to the measures of harmonization and to pronounce on the principles of intervention in the case of an emergency and to reach a decision both on the criteria and the measures which would be applied in such a situation.

Addressing the ECSC Consultative Committee last week, M. Roger Reynaud, a member of the High Authority, said that the recent slight cyclical improvement in coal consumption must not be allowed to conceal the relative structural weakness of coal in the energy market.

The outlook was not too good. Though in 1960 sales of coal were marginally higher than in 1959, consumption in the next few months was likely to be lower and he pointed out that while coal sales were almost static in 1960, sales of fuel oil rose by over 25 per cent. This led one to wonder, he said, what would happen to coal at a time when demand for energy was generally falling off.

The Council of Ministers last week agreed to limit output from the southern Belgian coalfield this year to 6,600,000 tons—half the tonnage raised six years ago. Production of anthracite is not affected as supplies are still scarce. To get extra help, Belgium must comply fully with the rationalization programme which requires 2,000,000 tons of capacity to be closed this year.

The Council agreed to spend $1,300,000 of ECSC funds to make up the pay of Belgian miners temporarily laid off and Belgium will be authorized to spend 400,000,000 fcs. (nearly £3,000,000) on interim subsidies of 3,300,000 tons of coal. She will, however, have to fix and enforce quotas for the marginal mines which are to get the subsidy and see that the production limit is observed in the whole southern coalfield.

Stating in Paris last week that the French coal industry was "in pretty good shape," M. Alexandre Verret, president of the Charbonnage de France, said the Government's plan for a 10 per cent. reduction in coal output between now and 1965 would affect the least productive sectors of the industry and render the industry in a better position to make French coal more competitive.

SERIOUS STEEL CRISIS would face India in five years' time if she did not go ahead with plans for expanding steel production by doubling existing plants or putting up new ones, Mr. Nehru said last Friday. Such a crisis would "bottle up all our progress," he told the National Development Council, which met to draw up the country's third five-year plan.

Company News

ICI Plans £35,000,000 Rights Issue

TO finance expansion plans and to replenish working capital, Imperial Chemical Industries, Limited, is to raise between £34,000,000 and £35,000,000 in the form of a rights issue to its ordinary holders of January 20. They will be offered one new £1 ordinary share at 55s. for each £20 ordinary stock. Between 12,584,450 and 12,910,000 shares are to be issued.

MR. S. P. CHAMBERS

The chairman, Mr. S. P. Chambers, said on Monday that the new money had not been earmarked for any particular project. At the end of last year the board had sanctioned capital schemes costing £51,000,000 and further expansion schemes would probably be approved this year. Although profit margins were lower he had no reason to suppose that 1961 would "in any sense be a bad year." ICI was not dependent upon any one section of industry or any one country and it therefore tended to be less vulnerable to the problems in any particular industry or country.

It was too early to give final profit figures for 1960, but it was estimated that group income, before tax, would be about £88,000,000, compared with £73,100,000 for 1959. This was after charging some £8,500,000 under the ICI profit-sharing scheme, against £7,100,000 the previous year. The directors expect to pay a final dividend of 1s. 6d. per share, making a total of 2s. 9d., against 2s. 3d. for 1959.

WILLSON LATHES, LIMITED—Consideration of an interim dividend for the year ending March 31, 1961, has been deferred until the end of February. It is proposed to adopt this policy for future years.

EDGE TOOL INDUSTRIES, LIMITED—Final dividend of 12½ per cent. makes 20 (17½) per cent. for the year ended September 30, 1960. Group net profit was £114,618 (£78,297), after tax of £109,260 (£68,829).

WM. PARK & COMPANY, LIMITED—Dividend of 16¾ (13¼) per cent. is recommended for the year ended September 30, 1960, on capital doubled by one-for-two scrip and rights issues. A further one-for-four scrip issue is proposed. Net profit was £259,397 (£99,649), after tax of £278,161 (£133,522).

DUNFORD & ELLIOTT (SHEFFIELD), LIMITED, Rollers and bright steel bar manufacturers—Some reduction in forward orders has been experienced in the current year. If the reduction continues, it will undoubtedly be reflected in the accounts for the year, reports the chairman, Mr. J. B. Talbot-Crosbie.

CHARLES ROBERTS & COMPANY, LIMITED, carriage and wagon builders and financiers, of Wakefield (Yorks)—No interim dividend on the ordinary capital for the year to next March 31, will be paid. When results are available, consideration will be given to paying a dividend in respect of the full period.

ELMORE'S METAL COMPANY, LIMITED—Issue of convertible unsecured loan stock by way of rights to existing shareholders is planned to raise about £180,000. It will be made as soon as possible after the creation of the 200,000 10s. ordinary shares for which a meeting has been called for February 3.

BIRFIELD, LIMITED, makers of general engineering supplies, of London, W.1—Sales for the three months ended October 31, 1960, totalled £7,096,000, compared with £5,748,000 for the corresponding period in 1959. Net trading surplus amounted to £885,000 (£439,000). It is not expected that these levels will be maintained in the current quarter.

GLACIER METAL COMPANY, LIMITED, manufacturers of plain bearings, bearing metals, diecastings, etc., of Wembley (Middx)—Declaring an interim dividend of 5 per cent. for year ending February 28, 1961, directors announce that the rights issue, forecast last year, will be at 12s. 6d. per 5s. ordinary, on a one-for-four basis. It is proposed to raise approximately £450,000 by the issue of the new 750,000 5s. ordinary.

MORGAN CRUCIBLE COMPANY, LIMITED—To complete the reorganization of the group, four new wholly-owned subsidiaries—Morganite Carbon, Limited, Morganite Crucible, Limited, Morganite Electroheat, Limited, and Morganite Research & Development, Limited, have been registered. The new companies, together with Morganite Exports, Limited, will take over the parent companys' trading activities from April 3 next, as outlined at the annual meeting last July.

AVELING-BARFORD, LIMITED, makers of road machinery, earthmoving equipment, etc., of Newcastle-upon-Tyne—As a result of increased demands on resources the group's bank overdraft has risen to £947,881 (£85,789) and it is, therefore, proposed, that the authorized capital be raised from £2,250,000 to £3,875,000 by the creation of 6,500,000 ordinary 5s. shares and that the director's borrowing powers be increased. There is no present intention of issuing further capital.

HARPER ENGINEERING & ELECTRONICS, LIMITED—Group sales in the year ended June 30, 1960, expanded from £2,200,000 to £10,400,000 and the net profit from £115,801 to £635,184. The dividend on the capital increased by acquisitions is at the forecast rate of 80 (30) per cent. Discussions are in progress for the provision of funds to replace a substantial part of bank borrowings, states Sir Stanley Rawson, the chairman. Total bank indebtedness was £1,857,947 compared with £386,156 previously. It is proposed to make a three-for-two scrip issue from the capitalization of £1,010,250 of share premiums.

Management Changes for Simon Engineering Group

SEVERAL appointments and changes in organization are announced by the Simon Engineering, Limited, group. Owing to ill health Mr. I. Hey will relinquish the chairmanship of Henry Simon (Holdings), Limited, on March 1, but he will remain a director of the company. His place as chairman will be taken by Mr. D. T. Barritt, who has been appointed to the board. Mr. Barritt, who will relinquish his executive responsibilities and his appointment as joint managing director of Simon-Carves, Limited, but will remain a director of the company, has also been appointed deputy chairman of Simon Engineering, Limited.

In the Simon-Carves, Limited, organization, Mr. J. P. V. Woollam has been appointed deputy chairman and Mr. L. Brook has been made a director of the company and a member of the management board. Mr. A. H. Bennett has been appointed a director of Henry Simon (Engineering Works), Limited, and Mr. J. G. MacLean, a director of Turbine Gears, Limited.

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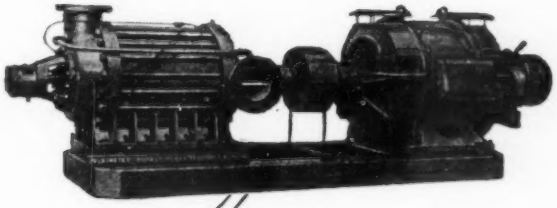

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Orders Placed

Ford's Order Blast Furnace

ONE of the companies in the Davy-Ashmore group, Ashmore, Benson, Pease & Company, Limited, blast-furnace makers, etc., of Stockton-on-Tees, has been awarded a contract by the Ford Motor Company, Limited, of Dagenham (Essex), to construct a new 20-ft. diameter hearth blast furnace, due to go into production in the summer of 1962.

This latest order will be the 50th blast furnace constructed by Ashmore, Benson, Pease in the past 30 years, Ford's having ordered the first.

FURTHER ORDER worth £37,000 for permanent way points and crossings, is to be supplied by the Isca Foundry Company, Limited, to the Malayan State Railways.

MAIN PROPULSION steam turbines and condensers for Britain's second nuclear submarine are to be designed and built by the English Electric Company, Limited, at its Rugby works.

CONTRACTS for the supply and installation of equipment worth £A3,000,000 for the New South Wales Electricity Commission have been awarded to Australian Electrical Industries, Pty. Limited.

ANOTHER 60/90 mobile asphalt plant—the fifth in two years—is to be supplied by Goodwin Barsby & Company, Limited, which is controlled by Aveling-Barford, Limited, to the Limmer & Trinidad Lake Asphalt Company, Limited.

SET of four electric screw-type jacks has been ordered from Matterson, Limited, Rochdale, by Shawinigan Water & Power Company. The jacks worth $10,000, are to be installed at the Shawinigan power station, 30 miles from Montreal.

A REPORT of the British Council for the Promotion of International Trade states that though some details are still to be settled, Millspaugh, Limited, manufacturers of non-ferrous centrifugal castings, etc., of Sheffield, has secured a £200,000 order to supply papermaking machinery to the East German Republic.

SUPPLY AND ERECTION in upper Assam of crude oil conditioning plant for Oil India, Limited, is to be undertaken by Whessoe, Limited, Darlington. The plant will condition the oil before it is pumped through the 720-mile pipeline from the Nahorkatiya oilfield to the new refineries at Nunmati and Barauni. The contract is worth about £900,000.

INSTALLATION of approximately 56 miles of plain track in running lines and sidings, together with the design, fabrication, and installation of some 350 sets of switches and crossings at Carlisle marshalling yard is to be undertaken by Eagre Construction Company, Limited, Scunthorpe (Lincs). The contract is worth £250,000 and was placed by the London Midland Region of the British Transport Commission.

FIVE CONTRACTS have been placed by British Railways North Eastern Region for the major part of the technical equipment to be installed in the new mechanized marshalling yards now under construction at Newport, near Middlesbrough. The two largest have been awarded to the Westinghouse Brake & Signal Company, Limited, and are for signalling and control equipment. British Insulated Callender's Cables, Limited, is to supply floodlighting and signalling cables, and the Tarmac, Limited, group is to build the two control towers.

UNDER A CONTRACT worth £80,000, Ruston & Hornsby, Limited, steel and iron founders, of Lincoln, and its associate Davey Paxman & Company, Limited, makers of diesel engines, boilers, etc., of Colchester (Essex), are to supply all the diesel power for a manganese mine nearing completion in the New Hebrides, South Pacific. The equipment is being installed at Forari, on the island of Efaté, where exploitation of manganese deposits is being carried out by the French company, Compagnie Françaises des Phosphates de l'Oceanie.

HYDRAULIC ash and fly ash collection and disposal plant is to be built by John Thompson Industrial Constructions, Limited—a member of the John Thompson, Limited, group, Wolverhampton—at Vales Point power station, New South Wales. The station will produce some 1,900 tons of ash a day, 350 tons of which will be fly ash. In addition the plant will collect and dispose of pyrites from 16 coal pulverizing mills in the station. The contract is worth £463,650 and was placed by the Electricity Commission of New South Wales.

ORDER WORTH £250,000 for the design, production and erection of coal and coke conveying installations at the new coke ovens battery at Cargo Fleet, Middlesbrough, of the South Durham Steel & Iron Company, Limited, has been secured by Birtley Engineering, Limited, Birtley (Co. Durham), a subsidiary of the Birmingham Small Arms Company, Limited. The equipment, which is being supplied to the order of the carbonizing engineers, Gibbons Bros., Limited, is required to be in service by August, 1962. This contract follows the recent completion by Birtley of similar work for the two companies at the new steelworks at West Hartlepool.

State Industries' Top Men Must Have Top Salaries

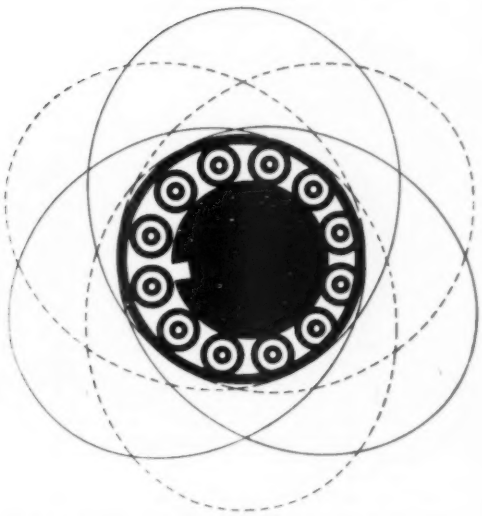
IN order to attract the right men to run them, the nationalized industries will have to pay salaries of more than £10,000 a year, Mr. John C. George, Parliamentary Secretary to the Ministry of Power, said last week at Leicester. At present, he went on, it was impossible to get the right men because they did not regard £10,000 a year as sufficient. They could get much higher salaries in private enterprise.

MR. J. C. GEORGE

Mr. George criticized the view that £10,000 a year was enough or too much for any man. "Whether the country is shocked or not, higher salaries will have to be paid to get top men to make nationalized industries run efficiently," he said. Contending that there should be greater competition between nationalized industries, Mr. George added that there was no need for the coal industry to fear competition from oil.

Coal consumption had dropped from 230,000,000 tons in 1954 to 195,000,000 tons in 1959, but increased last year to more than 202,000,000 tons. "Fear of unemployment is absolute nonsense," he said.

What mainly stops a bearing wearing?



How does a prop-shaft learn to torque?
Or a valve-seat, keep its trim?
Why does a plunger take the plunge,
and a gudgeon, start to swim?
In short: What is behind the workings of nearly *every* moving part in nearly *any* machine you care to think of?
... The answer is effective lubrication—plus a completely reliable filtration system.
In the AUTO-KLEAN literature you'll find a filter for every fluid—fuels, lubricants—hydraulics, and coolants; you will find all *types* of filter too—including the world's first and finest range of *fully-automatic* self-cleaning filters.
Quite a wide range; and it goes on increasing daily. That is why when you specify AUTO-KLEAN, you can be sure of the best in modern filtration techniques.

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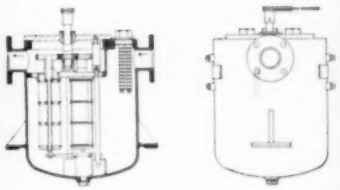
The 30M4 is specially recommended for all grades of oils. It can also be used, however, for distillates, water, chemicals, beverages, paints, resins, pulp and industrial liquids of every kind.
Principle: Edge-filtration using four all metal plate-type filters. Three magnetic filters on the inlet side give added protection against micronic ferrous particles

... This AUTO-KLEAN 30M4 self-cleaning filter



Advantages: (1) Full flow filtration. *All* the liquid passes through the filters to the *clean* side of the system. (2) Low pressure loss, ensuring high efficiency. (3) Self cleaning without dismantling or interrupting the flow. Two turns of the handle are all that is necessary. (4) Long life—lasts the life of the engine or plant. (5) Saves space and weight—large capacities relative to size.
Data: Handles up to 11,000 gallons per hour of lubricating oil in a defined mesh of 0.003". Defined meshes range from 0.0015" to 0.008". Maximum working pressure 50 p.s.i. Steam jacketed designs for high temperatures are available.

Full details sent on request

A range of filters is also available for varying applications and flows up to 150,000 gallons per hour.

NEWS IN BRIEF

TELEPHONE NUMBER of the River Don, Grimesthorpe, Park, Stevenson Road, and Tinsley Park works in Sheffield of the English Steel Corporation, Limited, is now Sheffield 49071.

FURTHER EXTENSION of one year is reported to have been granted by a mixed Allied-German commission to Herr Alfried Krupp to allow him to find a buyer for his steel and coal empire.

IN 12 MONTHS Imperial Chemical Industries, Limited, has paid out £28,524 to 9,000 employees for suggestions for improving production and efficiency. The biggest single payment was £684.

THE 350 MEN who came out on strike at Doncaster Coalite, Limited, over a demand for 6d. an hour extra because of dirty work, returned on Monday. The claim has gone to a higher level.

NUMBER of Nu-Swift pressure charges used and returned for recharging to the factory of Nu-Swift, Limited, fire extinguisher makers, of Elland (Yorks), reached a record figure of 46,596 during 1960.

TWO COMPANIES of British consulting engineers—Sir Alexander Gibb & Partners and Merz & McLellan—have been appointed to carry out further studies into hydro-electric power schemes in British Columbia.

THREAT OF large-scale redundancy has been reported to the Isle of Wight Employment Committee by J. Samuel White & Company, Limited, shipbuilders, of Cowes. The company employs 2,500 workers.

MR. NORMAN FISHER, principal of the National Coal Board Staff College and chairman of the BBC "Brains Trust," will be chairman at the first of a series of British Institute of Management conferences on "Management in the 1960's," to be held in London on March 7. At the invitation of the BIM, Mr. William H. Whyte, author of "The Organisation Man," is coming over from the US and will take a prominent part in the discussions.

IN THE blown fused silica ware section of the Physical Society 1961 craftsmanship competition, entries submittted by employees of the Thermal Syndicate, Limited, Wallsend, gained 1st, 2nd, and 3rd prizes and an honourable mention.

THE 75-YEAR LEASE of Hobart House, headquarters of the National Coal Board, in Grosvenor Place, London, S.W.1, has been sold for £1,093,000 to London County & Midland Trust, Limited. The yearly rent on the property is £96,000.

TURNOVER of Gutehoffnungshütte, one of Germany's leading heavy engineering concerns, rose by 6.5 per cent. to DM 3,163,000,000 (about £269,000,000) in the year ended June 30, 1960. Net balance was DM 10,000,000 (DM 9,900,000).

GEORGE COHEN SONS & COMPANY, LIMITED, states that following its announcement, made in good faith in November, of the introduction of a fork lift truck contract hire scheme, it now transpires that the 600 scheme was not in fact the first in this field.

PRODUCTION of Austria's foundry industry last year was well above that of 1959. Output of iron castings rose by 9 per cent., malleable castings by 18.5 per cent., heavy metal castings by 10 per cent., light metal castings by 13 per cent., and steel castings by 26 per cent.

MIDDLESBROUGH DOCK has completed its best year since 1930. Last year exports and imports totalled just under 1,000,000 tons, a rise of 160,000 tons on 1959. Exports were slightly lower, but iron and steel goods were well maintained. Imports of iron ore were about 300,000 tons, an increase of 70,000 tons. Other ores were almost doubled at 134,126 tons.

NET EARNINGS of the German steel producer, August-Thyssen-Hütte in 1960 rose to DM 31,000,000 from DM 16,482,000. Crude steel production totalled 3,900,000 (3,200,000) metric tons and the rolled steel output was 3,400,000 (2,700,000) tons. The dividend is raised to 12 (10) per cent.

FIVE FLOORS of a new 11-storey building are to be used for office staff of Philips Electrical Industries, Limited. The building is 50 yards from Century House, the London headquarters of Philips Electrical, and the site includes two swimming pools, run by the council and open to the public.

APPEAL FUND launched by University College of Swansea last autumn now stands at nearly £320,000. Recent contributors include:—Consolidated Zinc Corporation, Limited (£20,000); British Aluminium Company, Limited (£10,000); Duports, Limited (£3,500), and Baglan Bay Rolling Mills, Limited (£1,000).

AGREEMENT has been entered into by Tube Investments, Limited, with Techne (Cambridge), Limited, for rights to manufacture a micro-tensile testing machine developed at the TI research laboratories. The machine now deals with single crystal "whiskers" often too small to resolve with the naked eye.

TRAFFIC RECEIPTS of British Railways rose £19,000,000 (4.2 per cent.) last year to £466,000,000. Freight yielded an extra 2.5 per cent. at £316,000,000. Biggest gain in freight was by minerals traffic which yielded £49,000,000, an increase of 9.7 per cent. Coal and coke receipts of £108,700,000 were down by only £160,000.

COTTON WOOL ear plugs had no effect on low frequency sounds, which were the ones which damaged hearing and workers in industry should be educated to use special ear-plugs and ear-muffs, said Mr. D. M. Mercer, of Southampton University, speaking at a meeting of the Tees-side Industrial Accident Prevention Committee.

NEW OVERSEA AGENTS have been appointed by Thomas Smith & Sons (Rodley), Limited, crane and excavator manufacurers. They are as follow:—Bahrein, Gammons (Bahrein), Limited; Indonesia, R. Kaysons (Overseas) Enterprises; Burma, U. Aye & Company; Iran, the Marvdasht Company; Morocco, Etablissements R. F. Lambert.

ANOTHER MINIATURE CUPOLA, this time for use at the Accrington Technical College (Lancs), is under construction by apprentices at the works of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield. After making the first for their own training centre, Thorncliffe apprentices have supplied several for other firms and training centres.

IT IS UNDERSTOOD that leaders of the two most important shipbuilding unions, the United Society of Boilermakers, Shipbuilders, and Structural Workers, and the Ship Constructors and Shipwrights' Association, are considering a proposal that they should eventually merge and thus remove local rivalries which lead to crippling demarcation disputes.

DURING 1960 the Export Credits Guarantee Department insured more export business than ever before—a total of £694,500,000—under its "commercial" insurance scheme. Although the shipments declared for export in the last quarter of the year were £5,000,000 less than in the corresponding period in 1959, the year's figures showed an 8.8 per cent. increase over 1959.

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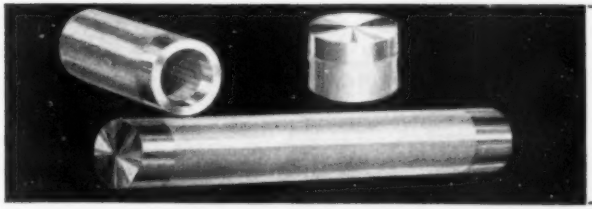

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Round Solid Rod
from ½in dia. to 2½in dia.

Round Cored Rod
from 1in o.d. x ½in i.d.
to 2½in o.d. x 2in i.d.

Minimum wall thickness ¼". All in 12 ft. lengths

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Hanley, Phone: Stoke-on-Trent 22184/5/6/7. *Longport, Phone:* Newcastle, Staffs 51433/4.

ACQUISITION of John Roper & Son, Limited, gear cutters, of Wolverhampton, has been announced by the Villiers Engineering Company, Limited, Wolverhampton. The business will continue without change other than an increase in production to meet the growing demand for the straight and spiral bevel gears and spur and helical gears in which John Roper specializes.

SWEDISH CONCERN of L. M. Ericsson states that Lasteknik, a subsidiary company, has purchased Ostmarks Lasfabrik, a lock manufacturing business employing about 30 workers in its factory at Eskilstuna. The purchase consideration was Kr. 757,807. Profits before taxes of Ostmarks Lasfabrik in 1958 and 1959 averaged Kr. 50,000. At the time of the acquisition, Lasteknik's name was changed to Ostmarks Lasfabrik.

TWO-YEAR Anglo-Soviet agreement on scientific, technological, educational, and cultural exchanges has been signed in Moscow. Covering the period from April 1, 1961, to March 31, 1963, the pact provides for scientific exchanges between the Royal Society and the Soviet Academy of Sciences, and for an exchange of lecturers and research workers. Specialists in industry and transport will also be exchanged.

NEW ASSOCIATION known as the Engineering Manufacturers' Association has been formed at Hinckley (Leics), by executives of seven of the town's engineering firms and it is hoped that more than 20 other firms will join. At the inaugural meeting Mr. E. W. Atkinson, of Atkinson Pressings, Limited, was installed as chairman, and there is to be a further meeting on January 30. The honorary secretary is Mr. W. Wood, director and general manager of Gears (Burbage), Limited, gear manufacturers.

AGREEMENT has been made between the Pakistan Industrial Development Corporation and Demag, of West Germany, for collaboration with the Karachi Shipyard & Engineering Works, Limited, under which Demag and the shipyard will make hydraulic, steel, and heavy structures, such as lockgates and sluice-gates. It will enable PIDC to supply heavy engineering equipment for dams and barrages to be constructed by the West Pakistan Water and Power Deveopment Authority as part of the Indus Basin replacement works.

European Conference to Study Coal Crisis

TRIPARTITE technical meeting to study the social consequences of the crisis in the coal-mining industry is now being held in Geneva. Seven countries—the UK, Belgium, France, Western Germany, Japan, the Netherlands, and the US—were invited to be represented.

The UK is represented by a tripartite delegation. The Government delegate is Mr. E. A. Ferguson, principal, Ministry of Labour, who has as adviser Mr. W. E. Fitzsimmons, principal, Ministry of Power. The employers' delegate is Mr. J. V. Wood, director-general of industrial relations, National Coal Board, who is accompanied by an adviser, Mr. D. Layton, head of the negotiation (ancillary workers) section of wages policy branch of the NCB, and a substitute delegate and adviser, Mr. M. R. Hyde, head of industrial relations department secretariat of the NCB. The workers' delegate is Mr. Edward Jones, vice-president of the National Union of Mineworkers, who has as substitute delegate and adviser, Mr. Jack Leathem, member of the national executive committee of the NUM.

Increases of Capital

DAVY & UNITED INSTRUMENTS, LIMITED, Sheffield, increased by £79,900, in £1 shares, beyond the registered capital of £100.

TUBELA ENGINEERING COMPANY, LIMITED, increased by £19,000, in £1 ordinary shares, beyond the registered capital of £1,000.

B.S.K. (ALUMINIUM), LIMITED, Birmingham, increased by £3,500, in £1 ordinary shares, beyond the registered capital of £3,500.

DOWTY GROUP, LIMITED, Cheltenham, increased by £2,000,000, in 10s. shares, beyond the registered capital of £4,000,000.

PEE-CEE ENGINEERING SUPPLIES, LIMITED, Bristol, increased by £5,000, in £1 ordinary shares, beyond the registered capital of £5,000.

MIDLAND ALUMINIUM, LIMITED, Wolverhampton, increased by £250,000, in 5s. ordinary shares, beyond the registered capital of £575,000.

DUCTILE STEELS, LIMITED, Willenhall (Staffs), increased by £750,000, in 5s. ordinary shares, beyond the registered capital of £750,000.

APPARATUS & INSTRUMENT COMPANY, LIMITED, London, W.C.2, increased by £2,500, in £1 shares, beyond the registered capital of £2,000.

LAWFORD PLANT & MACHINERY, LIMITED, London, W.1, increased by £4,900, in £1 ordinary shares, beyond the registered capital of £100.

CAMCOS (MACHINERY), LIMITED, Letchworth (Herts), increased by £50,000, in £1 ordinary shares, beyond the registered capital of £100,000.

TUBE INVESTMENTS, LIMITED, Birmingham, increased by £18,000,000, in £1 ordinary shares, beyond the registered capital of £27,250,000.

FERNHURST ENGINEERS, LIMITED, Godalming (Surrey), increased by £1,000, in £1 ordinary shares, beyond the registered capital of £1,000.

E.P.C. ENGINEERING COMPANY, LIMITED, Wilford (Notts), increased by £44,000, in £1 ordinary shares, beyond the registered capital of £8,000.

ASSOCIATED TUNNELLING COMPANY, LIMITED, London, S.W.1, increased by £35,000, in £1 ordinary shares, beyond the registered capital of £35,000.

ALBERT MANN ENGINEERING COMPANY, LIMITED, Basildon (Essex), increased by £135,000, in £1 ordinary shares, beyond the registered capital of £15,000.

WEST END WELDING COMPANY, LIMITED, North Shields, increased by £7,500, in £1 unclassified shares, beyond the registered capital of £25,000.

PRESLAND & PARTNERS, LIMITED, engineers, etc., of London, S.W.19, increased by £18,000, in £1 ordinary shares, beyond the registered capital of £2,000.

DAVY & UNITED ENGINEERING COMPANY, LIMITED, engineers, of Sheffield, increased by £2,999,900, in £1 shares, beyond the registered capital of £100.

NICKEL ANODES & NON FERROUS CASTINGS, LIMITED, Birmingham, increased by £100,000, in £1 ordinary shares, beyond the registered capital of £50,000.

HUDSON EVANS (BIRMINGHAM), LIMITED, engineers, etc., of Tamworth (Staffs), increased by £4,000, in £1 ordinary shares, beyond the registered capital of £2,000.

GEORGE WILSON & SONS (HUDDERSFIELD), LIMITED, ironfounders, etc., increased by £10,000, in £1 ordinary shares, beyond the registered capital of £5,000.

BRECKNELL, DOLMAN & ROGERS, LIMITED, ironfounders, etc., of Bristol, increased by £250,000, in 4s. ordinary shares, beyond the registered capital of £250,000.

TIPTON & MORLEY, LIMITED, dairy and agricultural engineers, etc., of Barnard Castle (Co. Durham), increased by £3,000, in £1 shares, beyond the registered capital of £5,000.

CONDER ENGINEERING COMPANY (MIDLANDS), LIMITED, constructional engineers, etc., of Winchester, increased by £20,000, in £1 shares, beyond the registered capital of £20,000.

HATCHETT & COMPANY, LIMITED, constructional and general engineers, etc., of Hyde (Ches), increased by £132,500, in £1 ordinary shares, beyond the registered capital of £85,000.

B. S. PALMER & COMPANY, LIMITED, manufacturers of machines, etc., of Fareham (Hants), increased by £140, in £1 ordinary shares, beyond the registered capital of £100.

REX NICHOLS & COMPANY, LIMITED, nut, bolt, and screw manufacturers, etc., of Birmingham, increased by £5,000, in £1 ordinary shares, beyond the registered capital of £25,000.

HAMER GOODLAD & COMPANY, LIMITED (formerly Aboudico, Limited), iron masters and founders, etc., of Eckington, increased by £9,900, in £1 ordinary shares, beyond the registered capital of £100.

WALMSLEY (BURY) GROUP, LIMITED, manufacturers of pulp and paper making machinery, etc., of Bury (Lancs), increased by £250,000, in £1 ordinary shares, beyond the registered capital of £1,200,000.

RICHARD SUTCLIFFE, LIMITED, mining specialists, general engineers, etc., of Wakefield, increased by £117,000, in 112,876 "A" ordinary and 4,124 unclassified shares of £1 each, beyond the registered capital of £383,000.

MIDLAND IRON GROUP (CRADLEY HEATH), LIMITED, increased by £499,900, in 300,000 7 per cent. cumulative preference shares of 10s. and 6,998,000 ordinary shares of 1s. each, beyond the registered capital of £100.

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Advertisements accompanied by a remittance and replies to Box Numbers should be addressed to the Advertisement Manager, Iron and Coal Trades Review, John Adam House, 17/19, John Adam Street, London, W.C.2. If received by first post Tuesday, they can normally be accommodated in the next Friday's issue.

SITUATIONS VACANT

ASSISTANT TO THE RAILWAY ENGINEER required by large Steel Works, to prepare and implement schemes for new track layouts, diesel locomotive repair shops, etc. Permanent position for men age 24/35 with opportunity to gain practical experience including routine maintenance. Must be able to prepare accurate railway layout drawings. A salary commensurate with the age and qualifications of the applicant will be paid, also assistance with removal expenses and temporary lodging allowance. Pension scheme and staff canteen facilities available. Apply to PERSONNEL MANAGER, ROUND OAK STEEL WORKS, Brierley Hill, Staffs.

PROGRESSIVE Company with expanding interests in the mining equipment field has vacancy for SALES ENGINEER in the SCOTTISH COALFIELD.

Preference will be given to candidates with previous sales and underground management experience.

This is a permanent progressive appointment, with car and expenses provided. A superannuation scheme is in operation.

Reply, giving full details of previous experience, to SALES DIRECTOR, Box PC374, IRON AND COAL TRADES REVIEW.

MINISTRY OF POWER: MINES INSPECTORATE. Permanent posts for men at least 27 on 1.4.61 with First Class Certificate of Competency under Mines and Quarries Act, 1954, and at least two years, normally within the previous five years, as manager or under-manager of a mine (preferably coal mine) under that Act. Practical knowledge of metalliferous mining and quarrying an advantage. National salary scale £2,280—£2,650. Starting pay may be above minimum. Write CIVIL SERVICE COMMISSION, 17 North Audley Street, London, W.1, for application form quoting S/4975.

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DIESEL DRIVEN ALTERNATING SETS, 400 440 3/50 cycles, 4 wire.

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162·5	Crossley/L.D.C.	500
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106	McLaren/Brush	1,000
62·6	National/Brush	1,000
62·5	McLaren/B. Peebles	1,000

With engine auxiliaries and alternator control gear.

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LARGE quantity of new spares for "U Series" Caterpillar D8 and DW10 Tractors. Apply: ORE MINING BRANCH, OF THE UNITED STEEL COMPANIES LTD., P.O. Box 25, Trecton, Rotherham.

FOR SALE. Exceptionally good 15-cwt. Ross Electric Pneumatic Hammer. "C" type frame. Built 1944 and done little work. With Anvil Block. REED BROTHERS (ENGINEERING) LTD., Replant Works, Woolwich Industrial Estate, London, S.E.18.

AIR COMPRESSORS for sale. Two 2,500 cu. ft. Belliss Morcom, 100 p.s.i., 550 h.p. motors; 2,300 c.f.m. Holland rotary 3-stage 150 p.s.i.; 600 cu. ft. Broomwade EH255, new 1952; 500 c.f.m. Broomwade EH251, 1943, 112 h.p.; 400 cu. ft. Broomwade EH245, new 1943, 90 h.p.; 300 c.f.m. Broomwade EH240, 100 p.s.i.; 60 h.p.; 250 c.f.m. Belliss Morcom, 100 p.s.i., 60 h.p. Also numerous others, and Air Receivers 1 ft. to 9 ft. dia., 100 to 1,000 lb. pressure.

LOCOS—Two Fowler 150 h.p. diesel; 2 Barclay 80 h.p. diesel, 0-4-0; 2 Ruston 16/20 h.p. 24 in. gauge diesel; 2 Hudson 20 h.p. 24 in. gauge diesel; 4 Logan 3-4 ton 24 in. gauge, battery operated, including two flameproof.

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EXAMINATIONS

MINING QUALIFICATIONS BOARD.

THE next Mining Qualifications Board Examination for First and Second Class Certificates of Competency as Managers and Under-Managers of Mines will be held on 16th, 17th and 18th May, 1961, at Glasgow, Sunderland, Doncaster, Wigan, Cardiff and Stoke-on-Trent. Candidates for limited Certificates of Competency as Managers and Under-Managers of Stratified Ironstone Mines will attend at the Doncaster Centre.

The Mining Legislation examination for Mechanical Engineer's Certificates, Electrical Engineer's Certificates, Mechanic's Certificates Class I and Electrician's Certificates Class I will be held at the above Centres on 16th May, 1961.

The written part of the examination for Certificates of Qualification as Surveyors of Mines will be held at the above Centres on 17th May, 1961, and the Oral and Practical examination in July, 1961.

Holders of the Higher National Certificate in Mining Surveying, or applicants who have passed the Intermediate Examination of the Royal Institution of Chartered Surveyors and are, therefore, exempt from the written examination must submit their applications not later than 22nd March, 1961.

Intending candidates should apply after 22nd February for the necessary forms, *stating whether they have previously attended an examination for any of the above Certificates.*

The completed applications should be returned to the SECRETARY as soon as possible, and must in any event be received not later than 22nd March, 1961.

Letters should be addressed to the Secretary, Mining Qualifications Board, Ministry of Power, Thames House South, Millbank, London, S.W.1.

Information Branch,
6th January, 1961.

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It is greatly regretted that owing to acute lack of space, both at our offices and at our printer's works, it is not possible to retain in store indefinitely obsolete blocks used in past advertisements in the "*IRON & COAL TRADES REVIEW.*"

Notice is therefore given that we shall be obliged to dispose of all advertisement blocks that have not appeared in the Journal since **December, 1957,** if no application has been received for their return on or before **January 29, 1961.**

Iron & Coal Trades Review,
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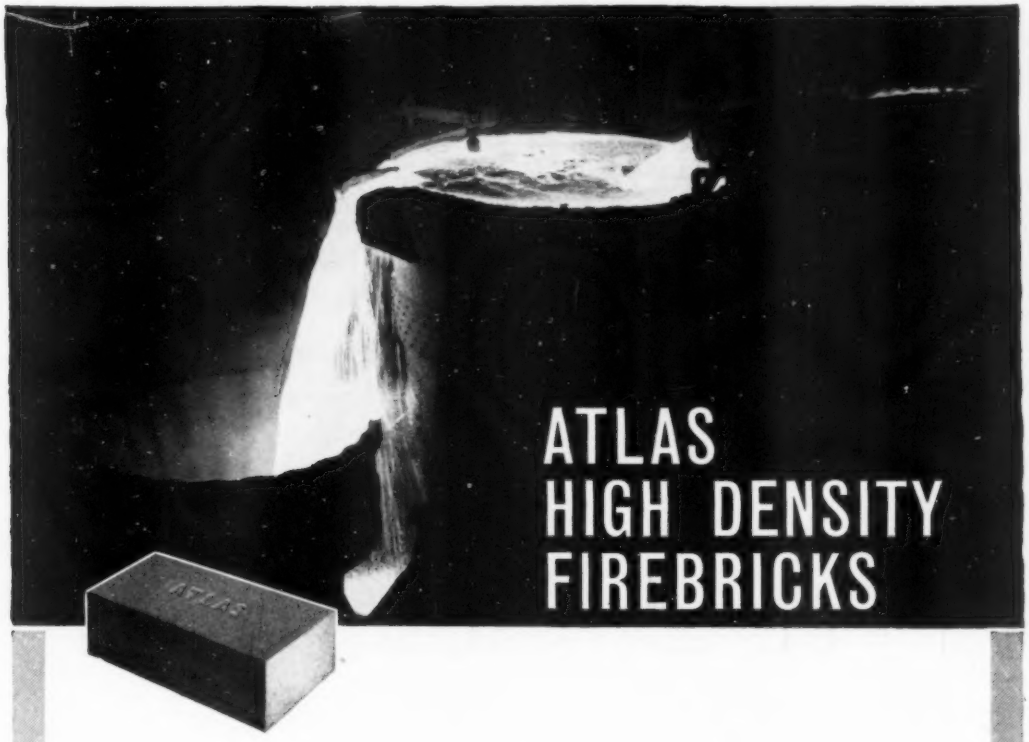

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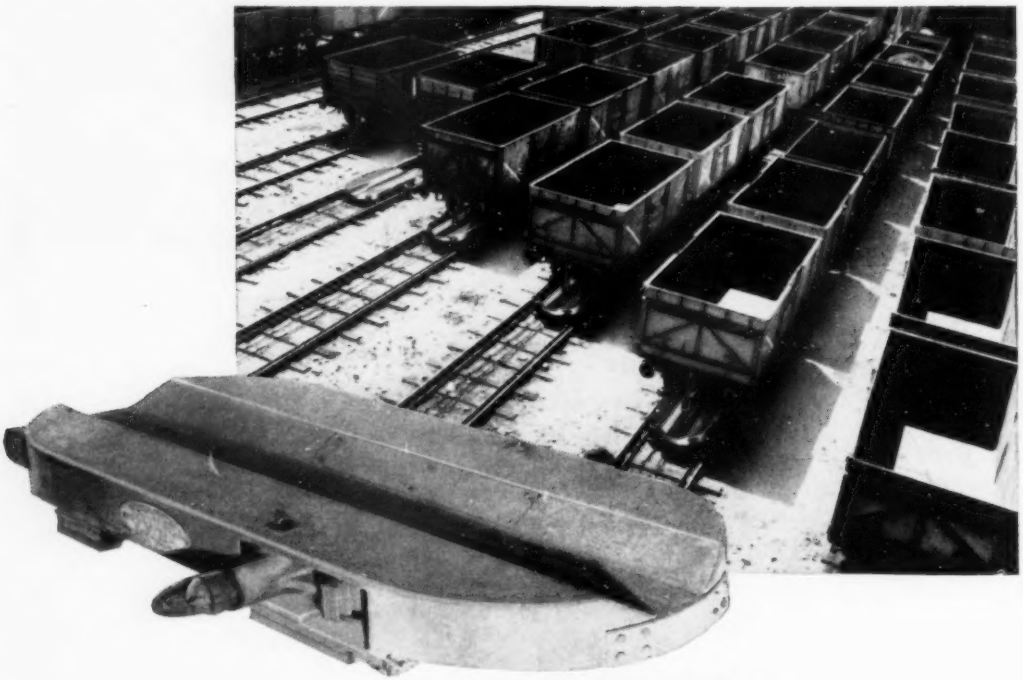

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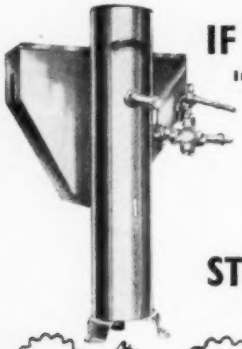

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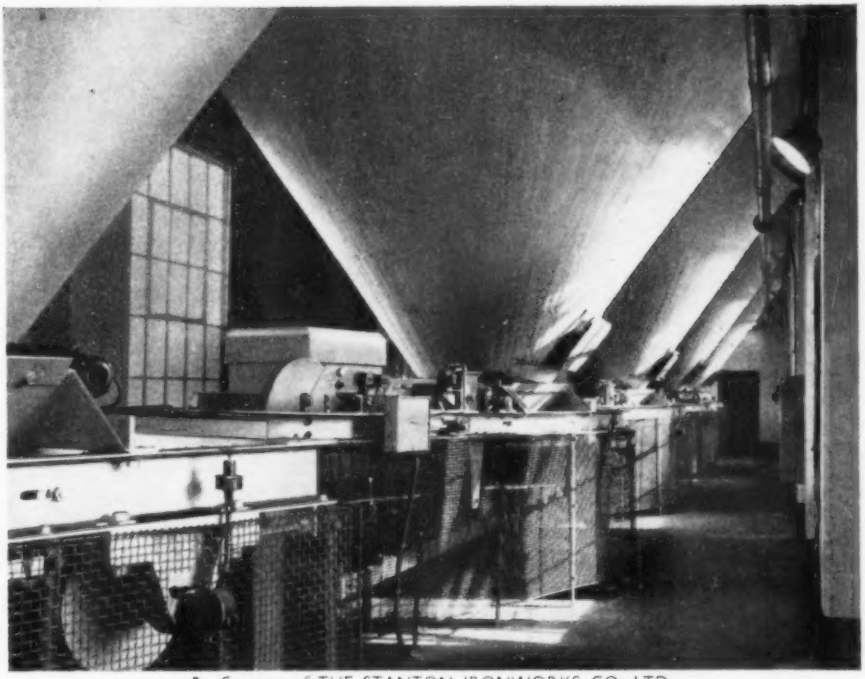

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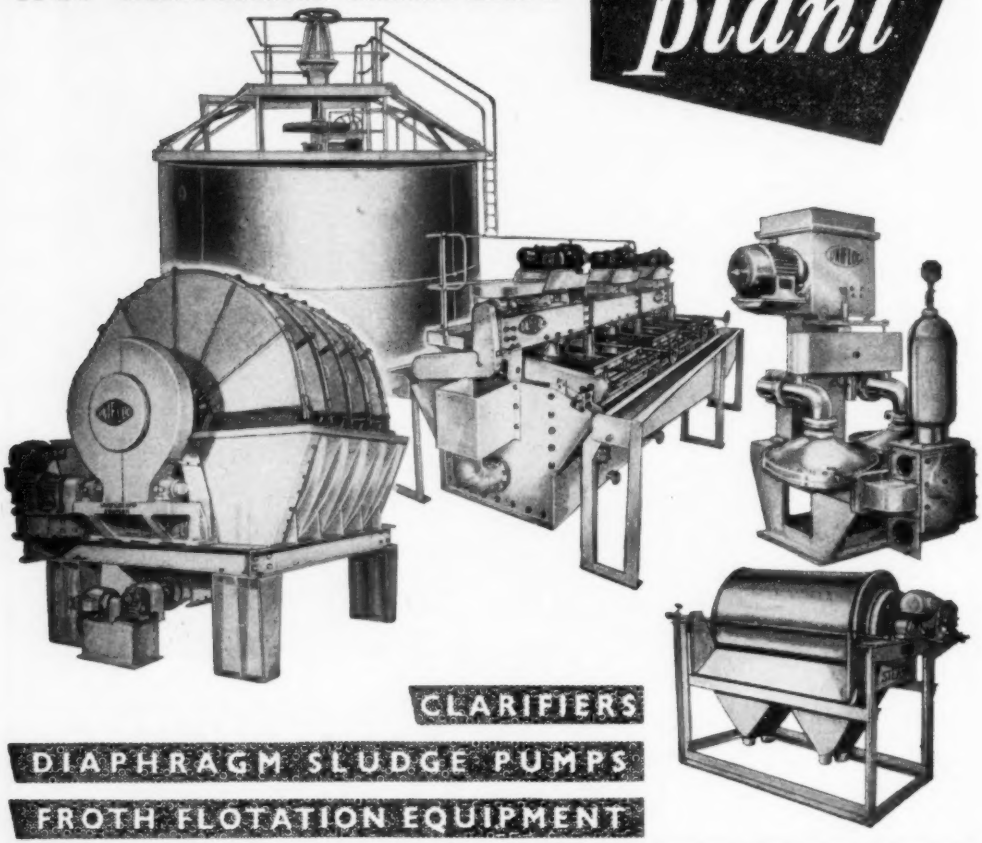

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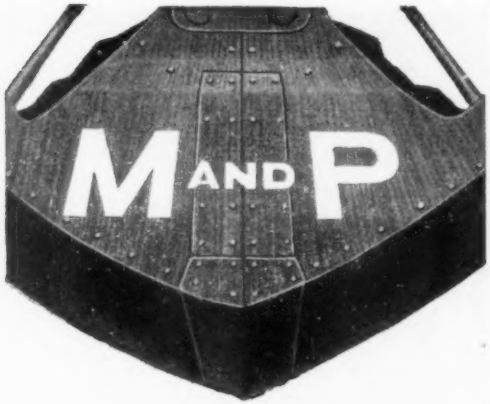

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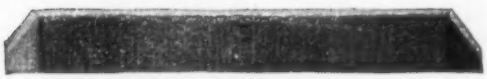

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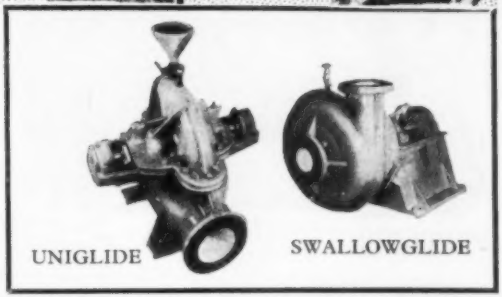

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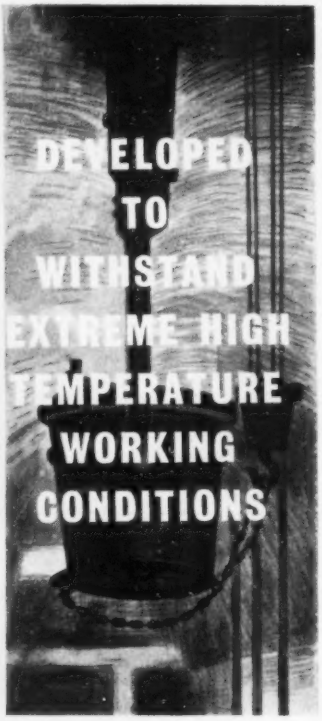

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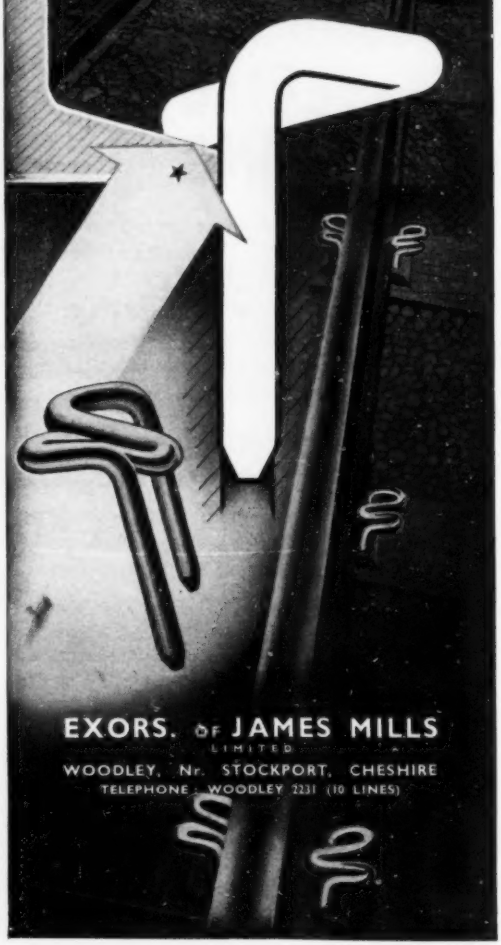

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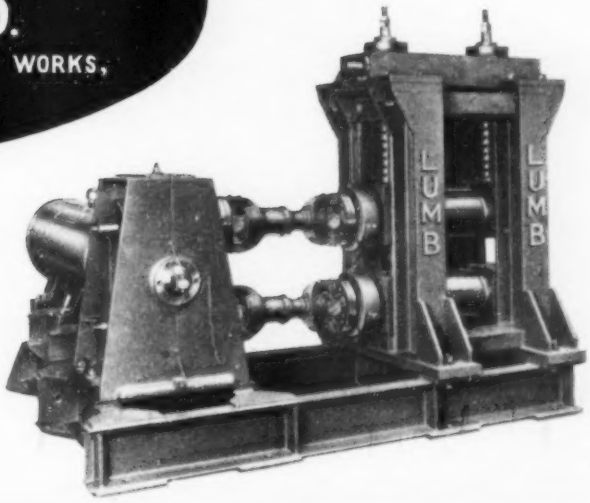

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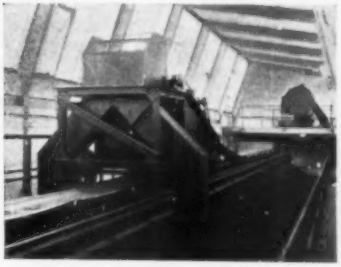

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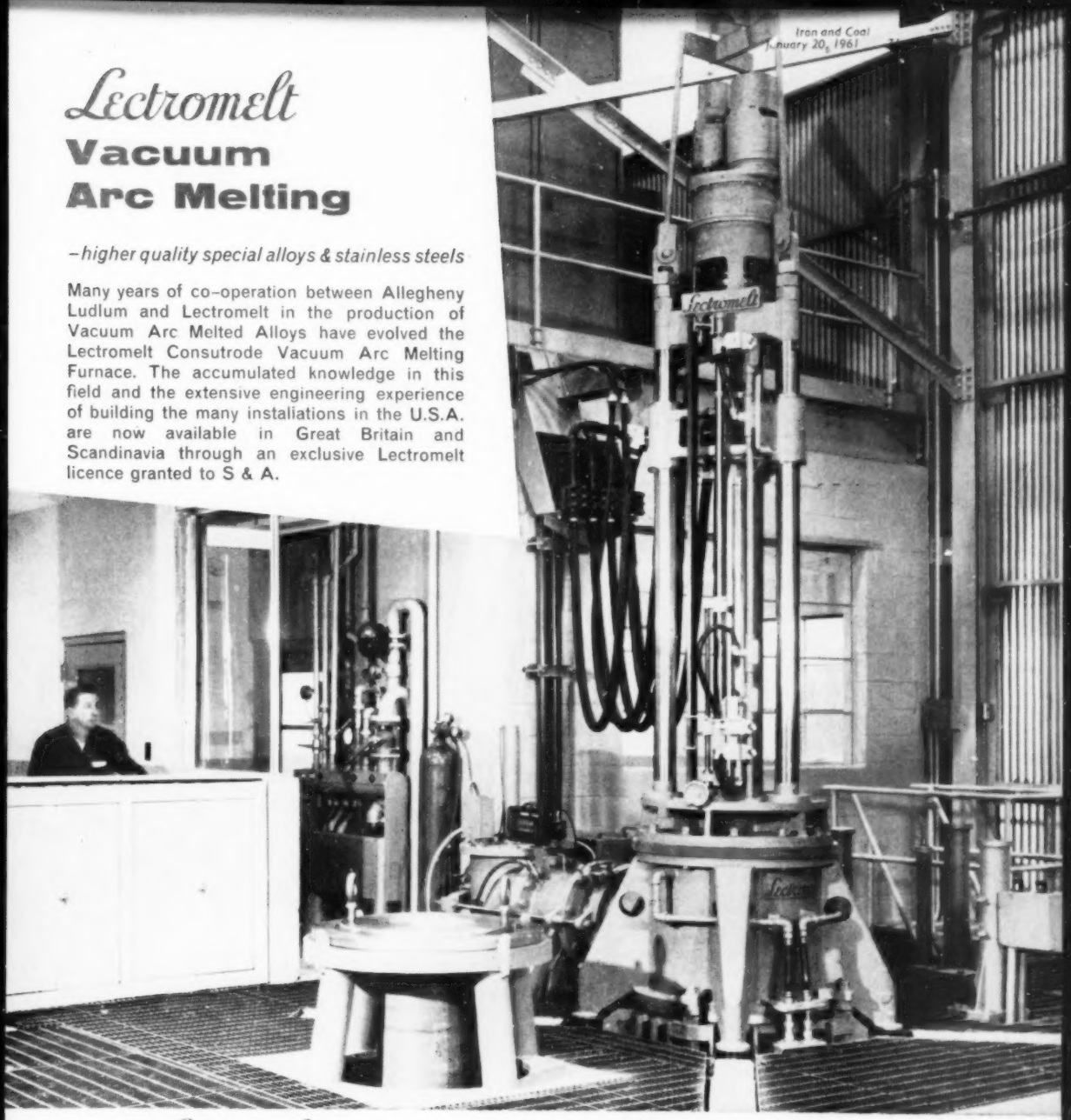

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